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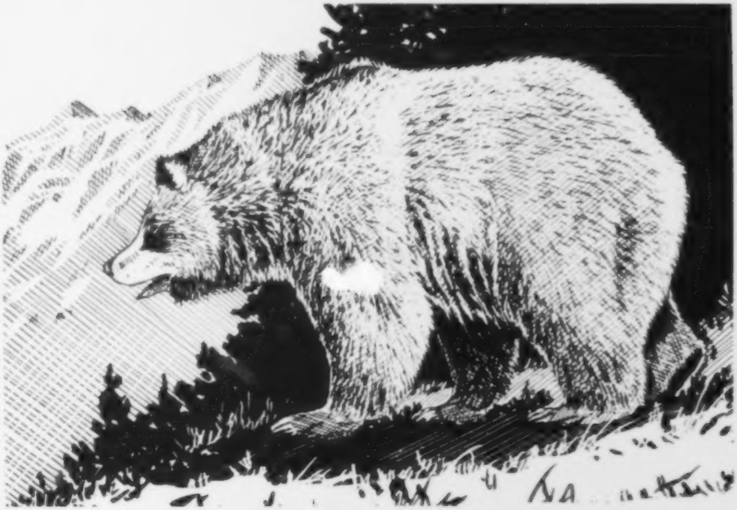

THE MAMMALS
OF BRITISH COLUMBIA

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by

IAN McTAGGART COWAN
HEAD, DEPARTMENT OF ZOOLOGY, UNIVERSITY OF BRITISH COLUMBIA, VANCOUVER, B.C.

and

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Illustrations by Frank L. Beebe

VICTORIA, B.C. FEBRUARY, 1956

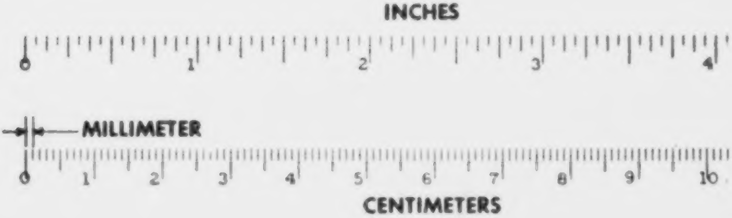
METRIC UNITS

10 millimetres (mm.) = 1 centimetre (cm.)
10 centimetres = 1 decimetre (dm.)
10 decimetres = 1 metre (m.)
1,000 metres = 1 kilometre (km.)

METRIC AND ENGLISH CONVERSION TABLE

Linear Measure

1 kilometre = 0.6214 mile
1 metre = 39.37 inches
3.2808 feet
1.0936 yards
1 centimetre = 0.3937 inch
1 millimetre = 0.03937 inch
1 mile = 1.609 kilometres
1 yard = 0.9144 metre
1 foot = 0.3048 metre
1 foot = 304.8 millimetres
1 inch = 2.54 centimetres
1 inch = 25.4 millimetres


INCHES
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3
4
MILLIMETER
0
1
2
3
4
5
6
7
8
9
10
CENTIMETERS

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1956

ERRATA

Page 23, line 24: For " *Vaccinum* " read " *Vaccinium.*"

Page 24, line 16: For " *mackenziei* " read " *mackenzii.*"

Page 28, line 7: For " *Ursus* " read " *Euarctos.*"

Page 110, bottom of page: Parry groundsquirrel omitted from key.

Page 197, Map 28: Range of *Synaptomys borealis wrangeli* should include the north-west corner.

Page 201, Map 29: For " *Phenacomys ungava mackenzi* " read " *Phenacomys ungava mackenzii.*"

Page 212, line 16: For " distinguised " read " distinguished."

Page 224, line 25: For " short " read " shorter."

Page 291, Map 40: Add question mark to north-west corner.

Page 337, line 2: For " *conclor* " read " *concolor.*"

Page 345, line 7: For " Stellar sea-lion " read " Northern sea-lion."

Page 345, line 25: For " Clements " read " Clemens."

Page 348, second line from the bottom: For " Steller sea-lion " read " Northern sea-lion."

Page 355, line 18: For "*Alces alces* " read "*Alces americana.*"

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The Mammals of British Columbia

INTRODUCTION

The mammals have not aroused quite as much popular interest as the birds. They are more secretive creatures, more often active during the poorly lighted parts of the day, and, for the most part, live lives in which the sense of smell is the most important contact with the world around them. Man is one of the few mammals with an indifferent capacity to smell things, and is in fact a visual creature. He thus finds in birds a group also dependent largely upon sight and sound for life's contacts. The brilliant colours, elaborate courtship behaviour, and obtrusive or pleasing sounds and songs of the birds so readily appreciated by us are not found among the mammals generally. Then, too, the birds are trusting creatures, secure in their ability to leave rapidly by flight should the occasion demand. Birds can be enjoyed casually and even without any particular effort; their observation can be part of mass outings. Not so the mammals; to know even a small part of them requires more care and devotion, more purposeful study in an atmosphere different from the average bird-watcher's field-day. Perhaps also to a slightly greater degree than with birds, close study requires that mammals be captured.

These very features, however, serve to arouse the curiosity and interest of serious students of nature and call forth more ingenuity, more persistence, more of the ability of the detective. There is a fascination about unravelling the innermost secrets of the lives of mammals beyond that presented by most other vertebrates.

Even though as a popular hobby, interest in mammals may well take second place to that in birds; the mammals demand greater attention from other groups in our population.

The large hoofed animals and flesh-eaters are sought by many thousands of hunters, either as a source of food or as trophies. All those species bearing soft, furry coats are sought by the trapper and turned to his economic gain; the whales are taken for their oil, flesh, or bones. Many other kinds interfere with our agricultural activities, eat our crops, deface our lawns, invade our homes, transmit diseases dangerous to man, or in other ways command our attention.

The biologist finds in mammals creatures intimately tied to the earth, unable to undertake rapid, long-distance movements and confined by tangible barriers of water, mountains, or desert, Thus mammals have been subjected in high degree to the forces that have shaped and directed the evolution of animals. Changes in colour and form over short distances are often pronounced, physiological adaptations are often more deep-seated. Hibernation has been added to migration as a means of avoiding inhospitable climatic circumstances.

This book has been prepared in an effort to meet some of the needs of each of the several groups interested in mammals. To serve the entire purpose of any one is beyond the possibility of a single volume. Most important in becoming acquainted with any living creature is an ability to identify it. Thus we have devoted ourselves largely to supplying this need. By keys, concise descriptions, and illustration we have provided means of identifying to species any mammal inhabiting British Columbia. To this level also we have provided both scientific and vernacular names. In choice of the latter we have been governed largely by the names used by Burt and Grossenheider in their recent Field Guide to the Mammals. The subspecies we have treated more briefly. The identification of many of them is dependent largely upon rather detailed differences in size or proportion of the skull. We have purposely avoided giving these but have cited references where such details may be found. In the majority of instances, subspecies of a species are closely alike and not discernably different except to the specialist. For these, therefore, we give only the scientific name in the belief that anyone seriously enough interested in mammals to want to know the subspecies should be conversant with scientific nomenclature.

There is considerable difference of opinion among students of animal classification on the matter of what criteria should be used to differentiate species from subspecies. We have used the concept that a species is a " kind " of mammal made up of many individuals capable of breeding with one another and doing so under field conditions. Interbreeding with other kinds of mammals that occur on the same area does not occur or occurs very rarely.

A species may include a number of slightly different forms of the same general kind. These forms differ in ways other than sex, age, or individual variations and occupy separate parts of the range of the species. These forms are referred to as subspecies. The subspecies that comprise a species usually interbreed with one another where their ranges come in contact.

For purpose of illustration the whitetail deer is a kind of deer distinctively different from the mule deer. These are species; they can occur in the same bit of forest without interbreeding. On the other hand, the mule deer and Coast deer, though apparently quite different animals, interbreed wherever they come in contact during the breeding season. They also share more features of structure than do the mule deer and whitetail. Thus the mule deer and Coast deer are regarded as belonging to the same species — called the blacktail deer—and of being merely different subspecies of this species.

In some instances, notably in such of the large mammals as the deer, sheep, and caribou, the subspecific differences are sufficiently obvious that there are popular names for them in current use. To leave these out for purpose of uniformity would be pedantic. We have used them wherever appropriate.

Under each species or subspecies we have given the distribution as is currently known and represented by specimens in the various museums of this continent. In very few cases is our knowledge of distributional boundaries accurate. Even for such an obvious mammal [illegible] the mule deer, for example, we have found ourselves unable to draw an accurate map of the northern limits of its range. Much of British Columbia is as yet unexplored from the standpoint of mammal distribution. We have in all instances cited the exact locations from which specimens are known. These lists will indicate the extent of precise knowledge. In the distribution maps provided for most species we have had to make the best possible approximation of the probable distribution based upon our knowledge of the species and its ecological requirements. In some instances, however, we have used interrogation marks on the maps to indicate that we have no information as to the presence or absence of the species.

Undoubtedly there are many people in the more remote parts of the Province who can fill in local details of distribution. We hope that the deficiencies of our maps will stimulate them to help us in this way. We hope also that by pointing up the large gaps in current knowledge of the distribution of the mammals of British Columbia we will stimulate interest and direct effort toward drawing the picture in more detail.

Short sections on habitat and biology are given under each subspecies, species, or genus as seemed most appropriate. In these we have attempted to include some of the facts most frequently sought by the teacher and student or other interested person. References to further detail are given.

Measurements are given in millimetres and weights in grams for the smaller forms and in inches and pounds for the larger species. The line of division has been necessarily arbitrary. In part we have been influenced by the type of interest in this sort of information. For purposes of conversion there are about 25 millimetres to the inch and 452 grams in a pound.

Our arrangement of the larger systematic groups follows Simpson (1947). Many of the species have come under our study over the course of the last twenty years. For these, the subspecific and specific terms used here accord with our findings. Many other groups have not been the subject of our special interest. For these we have used the names and combinations that seemed to us to best accord with the known facts. Where our judgment has departed from current usage, we have given a concise statement of the reason in a special paragraph headed " Remarks." We have purposely avoided the double "i" genitive ending in species names, save in two or three cases where there seemed to be special reasons for using it.

THE FAUNAL POSITION OF BRITISH COLUMBIA

The present work reviews a total of 126 species known to inhabit the Province. Species and subspecies together total 281. Had we felt justified in recognizing the species and subspecies of grizzly bears ascribed to the Province by Merriam (1918), the Provincial list would have been increased. However, there is little ground for believing that the majority of these names have any substance in reality, and pending a revision of the large bears we have rejected all Merriam names for them.

Other subspecies of small mammals still remain to be discovered. The islands along our coast are only partly explored, and it has already been shown that isolation of white-footed mice, field mice, and shrews particularly on these islands, for periods of up to 8,000 years, has led to the development of several subspecies unique in size, colour, or some other feature. The completion of biological exploration of these islands will certainly bring to light more such examples.

BIOTIC AREAS IN MAMMAL DISTRIBUTION

British Columbia has an area of 355,855 square miles and extends, on the mainland, from the 49th parallel to the 60th parallel of latitude. Its coast is fringed with an archipelago throughout its length, and the southern tip of this extends southward to 48° 20′.

The eastern boundary of the Province follows the summit of the Rocky Mountain Range from the 49th parallel to the 54th parallel; north of that it follows the 120th meridian of west longitude. Mountains are a characteristic feature of the geography, and these are arranged parallel to the coast in successive series extending in a general northwest-southeast direction.

The climatic influence of this topography in an area of prevailing westerly winds is to create roughly parallel series of wet and dry regions. The western faces of the Island and Coast ranges have a very high precipitation, and the western slope of each succeeding range is wetter than its eastern slope. Certain of the rain shadow areas in the intervening valleys are extremely arid. These characteristics are most obvious in the southern part of the Province.

North of the 52nd parallel the mountain ranges lying between the Coast Range and the Rocky Mountains are lower and generally exert a reduced influence on the climate. Here the intervening areas are of higher elevation and form the interior plateaux.

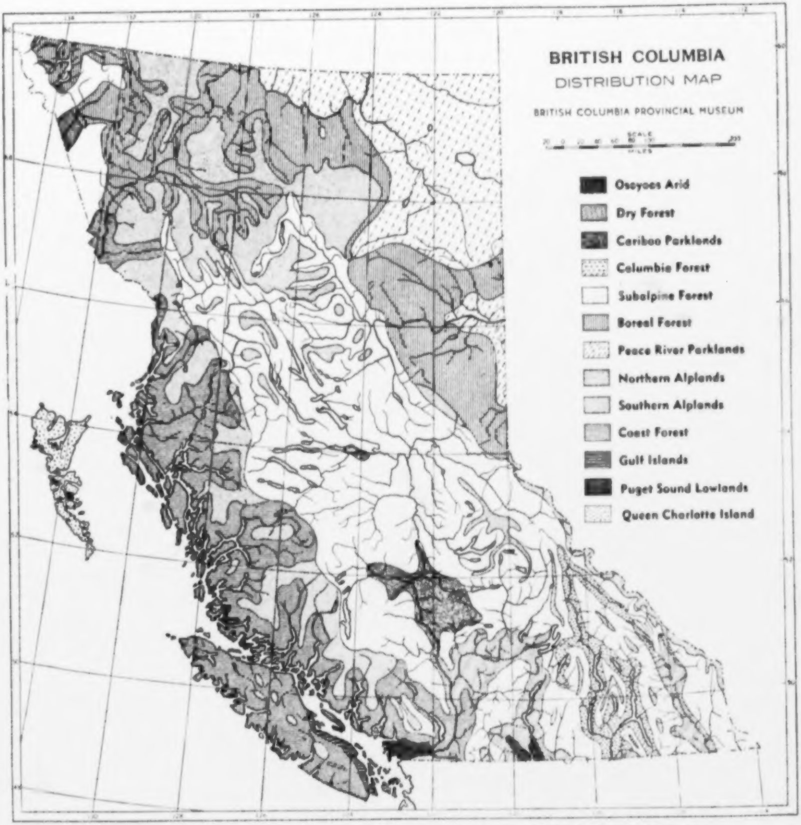
Five major river systems traverse the Province and have had an important influence upon the distribution of mammals. In many places they have served as avenues of distribution, in others they have acted as barriers; this is particularly true in the south, where the larger rivers do not freeze. The Columbia and Fraser Rivers flow in a generally north-south direction, and, with their tributaries, lie between the mountain ranges of the southern part of the Province. The Skeena, Stikine, and Mackenzie (Peace) systems of the northern half of the Province cut through the ranges in an east-west direction. Along the watercourses of the Skeena and Stikine the influence of humidity extends inland hundreds of miles and modifies the flora and fauna of the interior plateaux.

The Skeena intrusion has been particularly important in modifying the distribution of mammals and stands as a barrier between alpine forms of northern and southern origin, as, for example, the northern thinhorn sheep (*Ovis dalli*) and collared pika (*Ochotona collaris*) and southern bighorn sheep (*Ovis canadensis*) and Rocky Mountain pika (*Ochotona princeps*).

If Merriam's temperature-life zone concept be applied, the Province is found to include a small area of upper Sonoran zone in the southern Okanagan Valley; extensive Transition zone areas typified by the sagebrush plains and surrounding forests of Ponderosa pine, western larch, and interior-type Douglas fir. A second Transition zone type is represented in the Garry oak—madrone area of the islands in Georgia Strait and the south-eastern corner of Vancouver Island.

The Canadian zone forests cover the coastal parts of the Province to an altitude of between 4,000 and 5,000 feet and extend higher to the east. Above the Canadian zone on the mountains and descending into the valleys of the north is the Hudsonian zone with its widely spaced trees, of stunted or narrow spire form.

The Alpine-Arctic zone occupies the mountain-tops throughout the Province and extends altitudinally lower toward the north.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Osoyoos Arid
Dry Forest
Cariboo Parklands
Columbia Forest
Subalpine Forest
Boreal Forest
Peace River Parklands
Northern Alplands
Southern Alplands
Coast Forest
Gulf Islands
Puget Sound Lowlands
Queen Charlotte Island

Map 1. Approximate boundaries of biotic areas in British Columbia.

In an earlier work on the bird fauna of British Columbia (Munro and Cowan, 1947), a more detailed approach was taken to the distribution of the animal life of the Province. Using information on the distribution of birds and mammals along with major differences in plant cover, fifteen biotic areas were designated. In the eight years since this publication was issued, continued field study has enabled further refining of the boundaries of these areas and has strengthened our conviction that the biotic area concept is a useful one. In many regions the biotic area boundaries cannot be precisely drawn. However, Map 1 presents the boundaries of the terrestrial biotic areas as presently understood. We do not propose to repeat all the detail on biotic areas given in the work cited above, but present here a summary of the location, character, and most distinctive biotic elements of each.

OSOYOOS ARID BIOTIC AREA

This consists of a narrow strip bordering the Okanagan River for 30 miles between Skaha Lake and the International Boundary, as well as the Similkameen Valley south of Keremeos. The altitude is generally below 1,000 feet. Summers are hot, winters mild, and average annual precipitation less than 8 inches. The valley floor is increasingly subject to cultivation, and some of the distinctive vertebrates have been exterminated, while others are becoming progressively scarcer.

Except for dense riparian thickets, the general vegetation is that of a moist desert. Characteristic plants are the antelope-bush (*Purshia tridentata*), big sage (*Artemisia tridentata*), rabbit-bush (*Bigelovia graveolens*), and the cactus (*Opuntia polyacantha*).

Six distinctive mammals are the small-footed myotis (*Myotis subulatus melanorhinus*), pallid bat (*Antrozous pallidus cantwelli*), white-tailed jackrabbit (*Lepus townsendi*), cottontail (*Sylvilagus nuttalli*), harvest mouse (*Reithrodontomys megalotis*), and the pocket mouse (*Perognathus parvus lordi*).

DRY FOREST BIOTIC AREA

This biotic area includes the valleys of the Okanagan and Similkameen River systems with adjacent hills and benches north of and higher than the Osoyoos Arid. It includes also the Thompson Valley from Kamloops to Lytton and north to near Clinton. To the east of the Okanagan Valley this biotic area occurs discontinuously along the Kettle River and in the plains bordering the Kootenay River from Radium Hot Springs south to Newgate. Elevations covered range from about 1,000 feet at Penticton to 3,000 feet at Clinton and Cranbrook.

The summers are hot, the winters mild; rainfall averages less than 16 inches per annum.

Yellow pine (*Pinus ponderosa*) is the most characteristic tree on the bench lands, but it gives way at higher levels to Douglas fir and western larch (*Larix occidentalis*). Shrubs include the black hawthorn (*Cratægus douglasii*), choke cherry (*Prunus demissa*), serviceberry (*Amelanchier alnifolia*), and mock orange (*Philadelphus lewisii*).

Large lakes and ponds are numerous and contribute importantly to the maintenance of a very varied fauna.

Mammals restricted to this area or most abundant in it are a race of Yuma myotis (*Myotis yumanensis sociabilis*), badger (*Taxidea taxus*), mountain vole (*Microtus montanus canescens*), pocket gopher (*Thomomys talpoides incensus*), pocket mouse (*Perognathus parvus laingi*), chipmunk (*Eutamias amœnus affinis*), and yellow-bellied marmot (*Marmota flaviventris avara*).

CARIBOO PARKLANDS BIOTIC AREA

The geographic boundaries of this area are the eastern border of the Coast Range in the west and the North Thompson River on the east. To the north it blends with the Sub-alpine Forest on a front roughly between Soda Creek, Nazko, and Anahim Lake. On the south it merges with the Dry Forest along the northern edge of the Thompson River drainage.

Much farther north there are isolated areas ecologically similar in the Nechako and Bulkley Valleys.

The winters are cold, summers warm with frequent rain showers; precipitation is generally light.

The parklands proper are undulating, set with frequent lakes and ponds and dotted with clumps of aspen and lodgepole pine, or they are wooded with the same species. Forests are open with a light underbrush of willow and buffalo-berry (*Shepherdia canadensis*). An ancient forest of Douglas fir is widely represented, but it disappears after fire. Many of the open grassland areas appear to be the result of fires and are being invaded by trees.

The mammal fauna of this area is an amalgam of species drawn from the Sub-alpine or Boreal Forests to the north or from the Dry Forest to the south. Only three subspecies—the varying hare (*Lepus americanus pallidus*), the flying squirrel (*Glaucomys sabrinus reductus*), and the chipmunk (*Eutamias amœnus septentrionalis*)—have their centres of abundance there. The pygmy shrew (*Microsorex hoyi*), short-tailed weasel (*Mustela erminea richardsoni*), fisher (*Martes pennanti*), wolf (*Canis lupus columbianus*), jumping mouse (*Zapus hudsonius*), and moose (*Alces americana*) are of northern origin, though abundant in the Cariboo Parklands.

Among the mammals of southern origin are the long-tailed weasel (*Mustela frenata oribasus*), the yellow-bellied marmot (*Marmota flaviventris avara*), and the badger.

COLUMBIA FOREST BIOTIC AREA

The Columbia Forest occupies a discontinuous region in and between the Monashee and Selkirk mountain ranges. Altitudinally it lies below the Sub-alpine Forest, while to the south it gives way to the Dry Forest. It is best exemplified along Kootenay and Arrow Lakes, northward along the Columbia River to the Big Bend; at Mabel Lake, Sugar Lake, and along the eastern margin of Shuswap Lake. The area is popularly referred to as the Interior Wet Belt.

Climatically this area has moderately cold winters with heavy snowfall and hot summers with high rainfall. The mean annual rainfall at Revelstoke is 46.7 inches and the frost-free period 127 days.

Forests are dominated by such coastal species as western hemlock and western red cedar. White pine (*Pinus monticola*) is abundant. Paper birch (*Betula papyrifera*) is locally common, and black cottonwood (*Populus trichocarpa*) is dominant along the river-bottoms. Dense undergrowth includes devil's-club (*Echi-*

nopanax horrida), tall ferns, thimbleberry (*Rubus parviflora*), and raspberry (*Rubus* sp.).

The mammal fauna lacks distinctive elements. Certain Dry Forest species, such as the long-tailed weasel (*Mustela frenata oribasus*) and the white-footed mouse (*Peromyscus maniculatus artemisiæ*), are common to the Columbia Forest and Dry Forest but do not extend far into the Sub-alpine Forest. Most of the mammalian species, however, are derived from the Sub-alpine fauna. Notably the chipmunk subspecies (*Eutamias amænus affinis*), the meadow jumping mouse (*Zapus hudsonius tenellus*), and the subspecies of mountain vole (*Microtus montanus canescens*), characteristic of the Dry Forest, are absent from the Columbia Forest.

SUB-ALPINE FOREST BIOTIC AREA

The Sub-alpine Forest lies south of the Boreal Forest and generally above the elevation of 4,000 feet. This base level becomes lower toward the north and along the western slope of the Coast Range and is subject to much local variation. Its upper limit is timber-line on the mountain-sides.

The dominant climax tree species are Engelmann spruce (*Picea engelmanni*) and alpine fir (*Abies lasiocarpa*). Mountain rhododendron (*Rhododendron albiflorum*) is probably the most widely distributed shrub in the undergrowth, along with the huckleberries of several species. In the drier regions, as in the Rocky Mountains, mountain cranberry (*Vaccinum vitis idæa*) is common.

The winters are moderately cold, the summers cool and moist. Average annual precipitation at Glacier is 53 inches, but there will be wide variation from this in both directions.

The mammal fauna is closely similar to that of the Boreal Forest, but two microtine genera are represented by different species; i.e., the redback vole by *Clethrionomys gapperi* and the heather-vole by *Phenacomys intermedius*. Two species of jumping mice occur, *Zapus princeps and Zapus hudsonius*. In the southern part of the area the rufous-tailed chipmunk (*Eutamias ruficaudus ruficaudus*) is almost confined to the Sub-alpine Forest, and the varying hare (*Lepus americanus columbiensis*) is most abundant there.

BOREAL FOREST BIOTIC AREA

This region enters British Columbia along the eastern slope of the Rocky Mountains and covers all low elevations along the Stikine and Dease Rivers plateau, the Liard River, and Yukon drainage. Its southern boundary lies on the divide between the headwaters of the Stikine and Skeena Rivers, the headwaters of the Finlay River, and the southern tributaries of the Liard River.

The winters are cold, summers cool, and precipitation low. At Atlin, for instance, mean annual precipitation is only 12.52 inches.

The dominant tree species is white spruce (*Picea alba*) along with black spruce (*Picea mariana*) and tamarack (*Larix laricina*). The Alaska white birch (*Betula alaskana*), aspen, and cottonwood are abundant broad-leaved species.

The small mammals peculiar to this biota are the tundra redback vole (*Clethrionomys rutilus dawsoni*), the Arctic heather-vole (*Phenacomys ungava mackenziei*), the varying hare (*Lepus americanus macfarlani*), and the chipmunk (*Eutamias minimus caniceps*).

PEACE RIVER PARKLANDS BIOTIC AREA

The parkland forests of the northern great plains region enters the north-eastern corner of the Province between latitudes 55° and 60° along the tributaries of the Mackenzie River. Here the winters are cold, the summers cool, and precipitation moderate, about 18 inches per annum.

The outstanding feature of this parkland is mature aspen growing in open stands or dense woodland with scattered groves of white spruce and white birch. The ground is heavily vegetated with herbaceous plants.

As a vertebrate habitat, this area has many distinctive bird species, but its mammals are those of the Boreal Forest, except possibly for the saddle-backed shrew (*Sorex arcticus*), which is more abundant in the Parklands than elsewhere.

SOUTHERN ALPLANDS BIOTIC AREA

This area comprises the parts of the Province above timber-line and south of the Skeena River and Peace River watersheds. The lower altitudinal limits range from 4,500 feet on Vancouver Island to 7,500 in the Rocky Mountains.

Winters are long (about eight months) and cold, summers cool, and precipitation high.

The vegetation is characterized by the heaths and dwarf willows along with a profusion of flowering plants.

Mammals are abundant and include bog-lemming (*Synaptomys borealis*), hoary marmot (*Marmota caligata*), Rocky Mountain pika (*Ochotona princeps*), Columbian groundsquirrel (*Citellus columbianus*), mountain goat (*Oreamnos americanus*), and mountain caribou (*Rangifer arcticus montanus*). Of less general distribution are the mantled groundsquirrel (*Citellus lateralis tescorum*), the brown lemming (*Lemmus helvolus*), and the bighorn sheep (*Ovis canadensis*). Several of these species penetrate also on to open areas at lower altitudes.

NORTHERN ALPLANDS BIOTIC AREA

This area is composed of the parts of the Province above timber-line and north of the Skeena River and Peace River watersheds. No exact climatic data are available, but summers are short and cool, winters long and cold, and precipitation light. Some of the mammals, as, for instance, the brown lemming, are shared with the Southern Alplands; others are specifically distinct. Among the latter are Parry groundsquirrel (*Citellus parryi plesius*), collared pika (*Ochotona collaris*), and thinhorn sheep (*Ovis dalli*). These differences between the two alpland faunas largely arise from the origins of the animal populations in them. After the ice-cap of the Pleistocene had melted from the mountains, the Southern Alplands received migrants from the south, and the Northern Alplands from the ice-free area of the lower Yukon Valley.

COAST FOREST BIOTIC AREA

The entire timbered western slope of the Cascade and Coast Mountains, the greater part of Vancouver Island, and the coastal islands north of Jervis Inlet compose this biotic area.

The winters are mild, summers cool, and precipitation high. At Ocean Falls the average annual precipitation is 188.6 inches and at Swanson Bay 195.6 inches. The frost-free period exceeds 220 days.

The climax forest is dominated by western hemlock, western red cedar, Sitka spruce (*Picea sitchensis*), mountain hemlock (*Tsuga mertensiana*), yellow cypress (*Chamæcyparis nootkatensis*), and grand fir. A wide variety of seral forest communities occur. One particularly widespread one is dominated by the Douglas fir in dense stands. A still earlier association is of red alder (*Alnus rubra*) and broadleaf maple (*Acer macrophyllum*). Undergrowth may be dense or sparse, depending upon how shaded the forest floor is.

Many species of mammals have distinctive subspecies in this biotic area. The Columbian blacktail deer (*Odocoileus hemionus columbianus*), Roosevelt elk (*Cervus canadensis roosvelti*), snowshoe hare (*Lepus americanus cascadensis*), pika (*Ochotona princeps littoralis*), long-tailed vole (*Microtus longicaudus macrourus*), redback mouse (*Clethrionomys gapperi caurinus*), white-footed mice (*Peromyscus maniculatus austerus, P.m. macrorhinus, P.m. angustus*) and several insular subspecies, the shrews (*Sorex cinereus streatori, Sorex obscurus setosus, S.o. longicaudus*) and insular subspecies, and marten (*Martes americana caurina*) are noteworthy.

GULF ISLANDS BIOTIC AREA

The islands of Georgia Strait from Texada Island south to Saturna Island and a narrow strip along the south-eastern coast of Vancouver Island from Comox to Victoria and Rocky Point constitute this biotic area. It is of low elevation (below 1,000 feet) and lies within the rain shadow of the Olympic Mountains and the Island Range on Vancouver Island.

Temperature is moderate, the climate mediterranean in character. Average annual precipitation at Victoria is 26.7 inches, at Nanaimo 37.7 inches.

Over large areas Garry oak (*Quercus garryana*) and madrona (*Arbutus menziesii*) constitute a climax type. Elsewhere these trees slowly give way to a coniferous climax. A prominent feature of this plant form is the abundance of spring flowering bulbous and herbaceous plants.

The area has no mammals restricted to its boundaries, but the wandering shrew (*Sorex vagrans vancouverensis*), white-footed mouse (*Peromyscus maniculatus angustus*), and Townsend vole (*Microtus townsendi tetramerus*) are more numerous there than elsewhere. Changes in the flora and fauna resulting from logging, forest fires, and land-clearing have eliminated many larger species from the area.

PUGET SOUND LOWLANDS BIOTIC AREA

This consists of the delta of the Fraser River and the basal portion of the surrounding hills. It extends north to Burrard Inlet and southward into the Puget Sound region of Washington. The eastern boundary is at the apex of the delta near Hope.

The winters are mild, summers cool, and precipitation heavy. Average annual rainfall at New Westminster is 59.6 inches.

Deciduous second-growth forests consist of red alder, broadleaf maple, flowering dogwood (*Cornus nuttalli*), cascara (*Rhamnus purshiana*), black cottonwood (*Populus trichocarpa*), western birch (*Betula occidentalis*), and vine maple (*Acer circinatum*) in association. The climax forests are now scarce but differ little, in major species, from the Coast Forest.

This biotic area has a mammal fauna rich in species almost confined to it. Townsend mole (*Scapanus townsendi*), Coast mole (*Scapanus orarius*), Trowbridge shrew (*Sorex trowbridgii*), Bendire shrew (*Sorex bendiri*), shrew mole (*Neurotrichus gibbsi*), spotted skunk (*Spilogale gracilis*), striped skunk (*Mephitis hudsonica spissigrada*), long-tailed weasel (*Mustela frenata altifrontalis*), short-tailed weasel (*Mustela erminea streatori*), flying squirrel (*Glaucomys sabrinus oregonensis*), Townsend chipmunk (*Eutamias townsendi townsendi*), Townsend vole (*Microtus townsendi townsendi*), creeping vole (*Microtus oregoni serpens*), and snowshoe hare (*Lepus americanus washingtoni*).

QUEEN CHARLOTTE ISLANDS BIOTIC AREA

This consists of the Queen Charlotte Islands group.

The islands are heavily forested with Sitka spruce, western red cedar, western hemlock, and yellow cypress. On Graham Island there are extensive coastal plains where poor drainage has led to a muskeg condition with stunted lodgepole pine (*Pinus contorta*) dominant. Climatic conditions are similar to those in the Coast Forest.

The indigenous terrestrial mammal fauna is limited to the following species: Dusky shrew (*Sorex obscurus elassodon, S.o. prevostensis*), black bear (*Ursus americanus carlottæ*), marten (*Martes americana nesophila*), short-tailed weasel (*Mustela erminea haidarum*), white-footed mouse (*Peromyscus maniculatus keeni*), Sitka white-footed mouse (*Peromyscus sitkensis prevostensis*), otter (*Lutra canadensis periclyzomæ*), and Dawson caribou (*Rangifer dawsoni*).

COAST LITTORAL BIOTIC AREA

The waters close to the shores of Georgia Strait, Juan de Fuca Strait, Hecate Strait, the west coast of Vancouver Island, and the west coast of the Queen Charlotte Islands are inhabited by a vertebrate fauna differing in many particulars from the waters beyond the continental shelf.

The mammals of this region are the harbour seal (*Phoca vomerina*), northern sea-lion (*Eumetopias jubata*), California sea-lion (*Zalophus californicus*), sea otter (*Enhydra lutris*) (formerly), harbour porpoise (*Phocæna phocæna*), Baird dolphin (*Delphinus bairdi*), Pacific striped dolphin (*Lagenorhynchus obliquidens*), Dall porpoise (*Phocænoides dalli*), killer whale (*Grampus rectipinna*), humpback whale (*Megaptera novæangliæ*), pike whale (*Balænoptera acutorostrata*), and gray whale (*Eschrichtius glaucus*).

PELAGIC WATERS BIOTIC AREA

The offshore waters support a unique fauna. The mammals are few in number of species and almost entirely whales and porpoises. Among these the smaller species are imperfectly known, and several species probably occur that have not yet been recorded.

Mammals of this area are fur seal (*Callorhinus ursinus*), elephant seal (*Mirounga angustirostris*), Scammon blackfish (*Globicephala scammoni*), right whale (*Eubalæna sieboldi*), blue whale (*Sibbaldus musculus*), finback (*Balænoptera physalus*), sei whale

(*Balænoptera borealis*), sperm whale (*Physeter catodon*), Baird beaked whale (*Berardius bairdi*), Stejneger beaked whale (*Mesoplodon stejnegeri*), and Cuvier whale (*Ziphius cavirostris*).

THE ECONOMIC IMPORTANCE OF MAMMALS IN BRITISH COLUMBIA

Many of the mammals are of importance to us as sources of marketable furs, flesh, or oils. Others are the basis of the recreational pursuit of big game and small game by hunting. Still others, by killing our live stock, damaging our crops, our timber and fisheries, or by serving as host to parasites and diseases damaging to man and domestic animals, arouse our concern in their numbers.

The fur-bearing mammals contribute an annual harvest to the trappers of the Province worth as much as one and a half million dollars (1950–51). In this year the following wild-caught pelts were marketed by British Columbia trappers:—

Bear	73	Marten	12,039
Beaver	13,819	Mink	18,911
Ermine	36,061	Muskrat	103,724
Fisher	911	Otter	948
Red fox	219	Raccoon	510
Silver fox	57	Squirrel	407,953
Cross fox	178	Wolverine	399
Lynx	1,399		

At the market price prevailing in 1951 these pelts paid the trappers an average of $4.30 for every square mile of the Province's area. Over thousands of square miles, fur is the only crop that can be taken.

British Columbia has more species of big-game mammals than any other part of Canada. Not only does the sporting use of the surplus annually available in our game herds serve as the support of a thriving industry, but the meat contributed to the national larder is important. It is estimated that in 1953–54, for example, about 6,000,000 pounds of big-game meat were taken in the Province.

The harvest consisted of about 14,200 Columbian blacktail deer, 9,700 mule deer, 4,000 whitetail deer, 500 wapiti 5,190 moose, 300 mountain sheep, 600 mountain goat, 400 caribou, 300 grizzly bear, and 1,500 black bear.

The marine mammals, too, are put to economic use. In 1951, for instance, the small-scale whaling industry operating out of Coal Harbour, Vancouver Island, took 437 whales, made up of 216 finbacks, 153 sperms, 51 humpbacks, 9 blue whales, and 8 sei whales. These were converted into oil, fertilizer, whale solubles, and meat. There have been occasional attempts to use the northern sea lion for animal-food, but these have failed as commercial ventures.

The mammals can often be harmful to human interests, and as some species can be beneficial or harmful, depending upon local circumstances, a decision on over-all position is not easy.

Forest plantations can be damaged by deer, snowshoe hares, squirrels, porcupines, black bears, and the white-footed mouse. The latter has been shown to be a particularly efficient destroyer of forest-tree seed.

The farmer and orchardist find among the field mice or voles several species that can be most serious as agricultural pests. Notable are the meadow vole and mountain vole in the Okanagan Valley and the creeping vole in the Fraser delta. Here, too, the Coast mole can cause economic loss to market-gardeners, small-fruit growers, golf-course operators, and home-gardeners. Other mammal pests of the farm can be deer, groundsquirrels, and the smaller carnivores.

The ranchers have suffered sometimes severe losses to their flocks and herds from coyotes, wolves, bears, and mountain lions. The control of these species is the duty of the predatory animals branch of the British Columbia Game Department.

Along the coast the gill-net fisherman and troller for salmon maintain that hair seals and sea lions are destructive of nets and gear as well as taking many fish. On the strength of these complaints, a $5 bounty is maintained on hair seals, though this has not been shown to have any measurable influence on seal populations or reduction of damage.

From the standpoint of public health, several diseases transmissable to man are maintained by the wild mammals of the Province. Tularæmia has been isolated from snowshoe hare, voles, and beaver; sylvatic plague from the mantled groundsquirrel; Rocky Mountain spotted fever can be carried by many species. Foxes, coyotes, wolves, and some smaller flesh-eaters can transmit rabies.

The large hoofed mammals and timber wolves serve to support a wild cycle of the hydatid disease. Many other species carry parasites transmissable to man or his live stock. Thus it is that we seek to influence animal numbers for many purposes, and wildlife management has become one of the established professional fields of zoology.

THE STUDY OF MAMMALS

Learning to know the mammals requires close study. Many of the smaller forms are secretive, elusive, and nocturnal. Many live in burrows, from which they seldom emerge during daylight hours. All these features of behaviour make it most difficult to become familiar with mammals except by seeking them out with traps of various special designs. The choice of traps, and baits, the location of sets, and the subsequent preparation of specimens for study and preservations involve skills that can be acquired with a bit of application and practice.

An excellent book on these aspects of mammal study is "Methods of Collecting and Preserving Vertebrate Animals," by R. M. Anderson, Bull. 69, National Museum of Canada.

There are also a number of excellent general books on the mammals of North America from which details not supplied in the present volume can be obtained. Among the field books, "A Field Guide to the Mammals," by W. H. Burt and R. P. Grossenheider, published by Houghton Mifflin Company; "How to Know the Mammals," by E. S. Booth, published by Wm. C. Brown Company; or the less-detailed "Mammals, a Guide to Familiar American Species," written by H. S. Zim and D. F. Hofmeister, published by Simon and Schuster, are all useful. A more general treatment of North American mammals is provided by Victor Cahalane in his "Mammals of North America," published by Macmillan Company. "The Natural History of Mammals," by François Bourliere, published by Alfred Knopf, New York, is a very useful and interesting general reference.

Many of the monographic treatments of families or genera are to be found in the series "North American Fauna," published by the United States Fish and Wildlife Service; others appear in the Journal of Mammalogy along with a wide variety of other articles upon various aspects of mammalogy. Much technical information on the game species is to be found in the Journal of Wildlife Management.

Several of the larger mammals have been the subject of special studies. Among these, "The Wolves of North America," by Stanley P. Young and E. A. Goldman; "The Puma, Mysterious American Cat," by the same authors; "The Clever Coyote," by Stanley P. Young; and "The Elk of North America," by Olaus J. Murie, all published by the Stackpole Company, Harrisburg, Pennsylvania; and the "North American Moose," by Randolph L. Peterson, published by University of Toronto Press, are all of them worthy of a place on the naturalist's book-shelf.

"Lives of Game Mammals," by E. T. Seton, published in several editions of from four to eight volumes, is a mine of useful historical and biological information. Data on breeding habits are summarized in "Patterns of Mammalian Reproduction," by S. A. Asdell, published by Comstock, Ithaca, New York. Other useful references will be found listed in the Literature Cited section.

THE MAMMALIAN SKULL

All mammal skulls are composed of the same bones. However, these bones can vary so much in shape that each species of mammal has its own distinctive shape of skull. Thus it is that the skulls of mammals are most useful in identification, and, indeed, many of the described subspecies differ more in skull form than they do in external appearance or dimensions.

Any serious student of mammals will find it well worth while to become familiar with the anatomy of skulls. To assist in this we have provided the accompanying figures of skulls of beaver (Fig. 1), coyote (Fig. 2), and deer (Fig. 3) as representative of three distinctively different types.

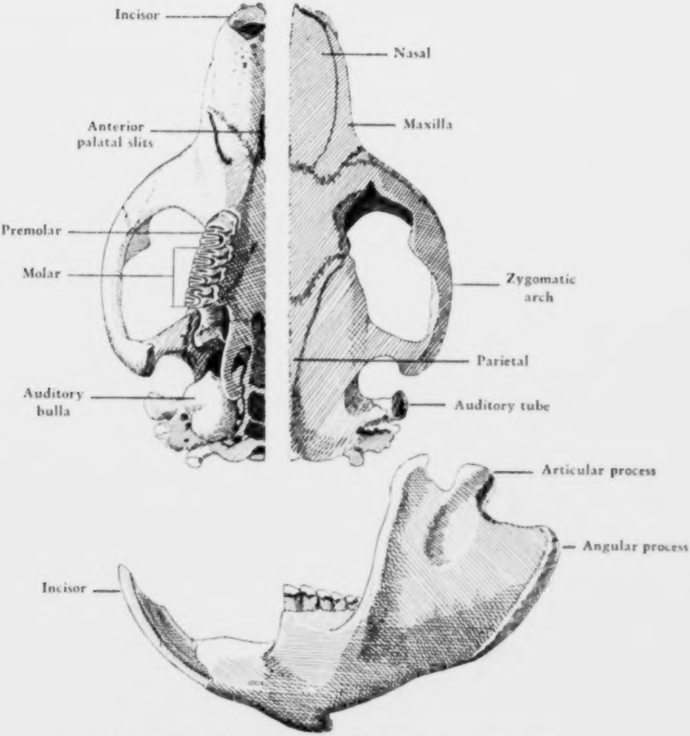

Incisor
Nasal
Anterior palatal slits
Maxilla
Premolar
Molar
Zygomatic arch
Parietal
Auditory bulla
Auditory tube
Articular process
Angular process
Incisor

Fig. 1. Skull of beaver to show structural features.

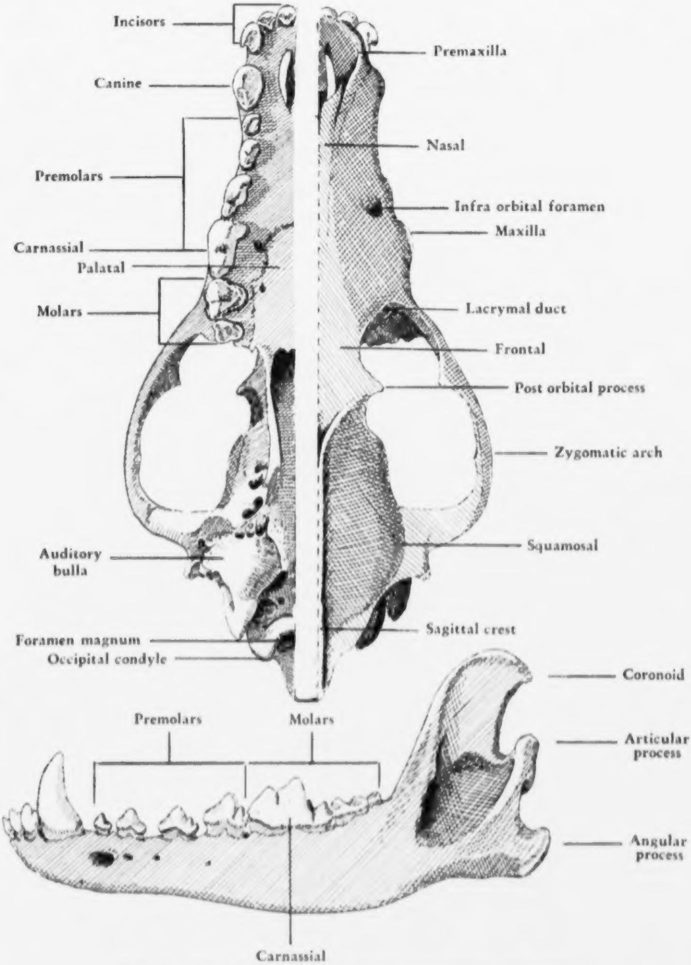

Incisors
Premaxilla
Canine
Nasal
Premolars
Infra orbital foramen
Maxilla
Carnassial
Palatal
Molars
Lacrymal duct
Frontal
Post orbital process
Zygomatic arch
Squamosal
Auditory bulla
Sagittal crest
Foramen magnum
Occipital condyle
Coronoid
Premolars
Molars
Articular process
Angular process
Carnassial

Fig. 2. Skull of coyote to show structural features.

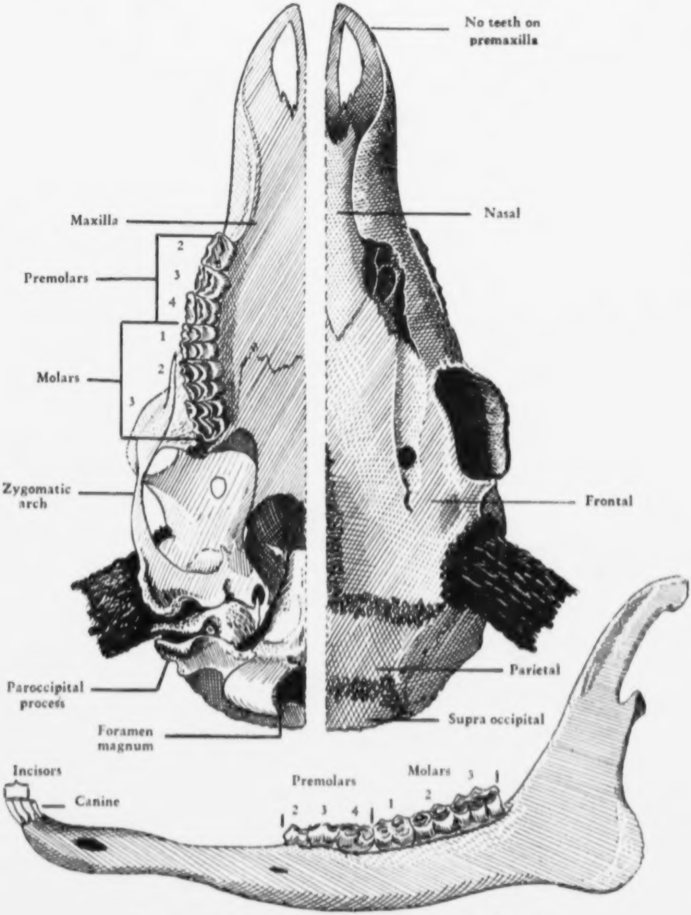

No teeth on premaxilla
Maxilla
Nasal
Premolars
2
3
4
1
Molars
2
3
Zygomatic arch
Frontal
Paroccipital process
Parietal
Supra occipital
Foramen magnum
Incisors
Canine
Premolars
2
3
4
Molars
1
2
3
1

Fig. 3. Skull of deer to show structural features.

HOW TO USE THE KEYS

We have provided keys to the orders of mammals, and in all orders except the Cetacea we have prepared keys to the species. The keys are a short cut to the identification of the mammal you are studying. By using the keys rather than hunting through the illustrations, you will come to a correct identification more quickly, and you will, at the same time, be learning something more about mammals.

A key consists of a number of opposite statements that serve to divide the mammals into smaller and smaller groups on the basis of increasingly more detailed differences, until you come to the one set of conditions that fit your specimen; these are followed by the animal's group or its species name.

If you have no idea what group your animal belongs to, you begin by using the key to the orders; then having determined the order, you turn to the page indicated and consult the key to the species in that order.

Let us consider an example. You have trapped a muskrat-sized animal that has been coming out of a burrow and eating the vegetables in your garden. It is brown in colour, has long front claws, small eyes, and virtually no tail. You turn to the key to the orders and find under No. 1 " Body fish-like," and under 1′ " Not so." Obviously your animal is not fish-like, so it comes under section 1′. Looking further under No. 2 you find, " Fifty teeth; hind foot with 5 toes, of which the inner is thumb-like." This does not fit your specimen, so No. 2′, " Not so," must fit. In the same manner, No. 3 does not apply, and you turn to 3′, which states " tooth rows with diastema." Your specimen has a large gap between the front teeth and the cheek teeth, and thus fits this statement. Under 3′ the first number is 6, which states, " One or two incisors on each side above, one incisor on each side below; feet with claws." Your specimen fits this, so you go on to No. 7, which reads, " One incisor on each side above." Careful examination is needed to make sure there are not two small teeth tucked close behind the two big front teeth. Your animal has only two front teeth on the upper jaw and is therefore identified as a rodent, Order Rodentia.

You turn to the Order Rodentia on page 109 and start with No. 1, which does not apply, so you turn to 1′, which does. The first number under 1′ is 13, which does not apply, and you turn to 13′ and under it to 14. The tail is not covered with quills, so you proceed to 14′. The tail is not flattened and scaly, so 15 is false and 15′ correct. Similarly, 16 does not apply and 16′ does; 17 does not fit your animal, 17′ does. No. 18 states "body length 11 inches, tail very short, about 1 inch, and completely covered with brown fur." This describes your specimen, and you have thus keyed it down to be a mountain beaver.

Next you turn up the discussion of the mountain beaver in the text and verify your identification. If the description obviously does not fit, you have made a mistake in working the key and must start again. In this case, however, you find your animal described and pictured; you have made a correct identification.

With a little practice you will begin to recognize the orders and will have no further use for this key.

KEY TO THE ORDERS OF BRITISH COLUMBIA MAMMALS

1. **Body fish-like, hairless; nostrils one or two, on crown of head; no hind limbs; tail provided with flattened flukes; forelimbs paddle-like. Whales and porpoises. *Order Cetacea.***

1′. **Not so.**

2. **Fifty teeth; hind foot with five toes, of which the inner one is thumb-like and without a claw; female with an external pouch on the abdomen. Opossum. *Order Marsupialia.***

2′. **Not so.**

3. **Tooth rows continuous, that is to say, without a true diastema (no space between canine and premolars as long as first molar) (*see* Figs. 1 and 2); canine teeth present above and below, though they may not be different in form from the incisors; six incisors in upper jaw. Moles, shrews, bats, and canivores.**

4. **Forelimbs modified as wings. Bats. *Order Chiroptera.***

4′. **Forelimbs not modified as wings.**

5. **Canine teeth little, if any, larger than adjacent teeth; snout long and pointed. Shrews and moles. *Order Insectivora.***

5′. **Canine teeth plainly longer than adjacent teeth and sharply pointed; snout not long and pointed. Flesh-eaters and seals. *Order Carnivora* and *Order Pinnipedia.***

3′. **Tooth rows with diastema (space between canine and premolars as long as or longer than first molar).**

6. **One or two incisors on each side above, one incisor on each side below; feet provided with claws.**

7. **One incisor on each side above. Rodents. *Order Rodentia.***

7′. **Two incisor teeth on each side above. Rabbits and pikas (*see* Fig. 10. p. 91), *Order Lagomorpha.***

6′. **No upper incisors; four incisor-like teeth on each side below; feet with hoofs. Hoofed animals. *Order Artiodactyla.***

ORDER MARSUPIALIA—POUCHED MAMMALS
FAMILY DIDELPHIDÆ—OPOSSUMS
GENUS DIDELPHIS—OPOSSUMS

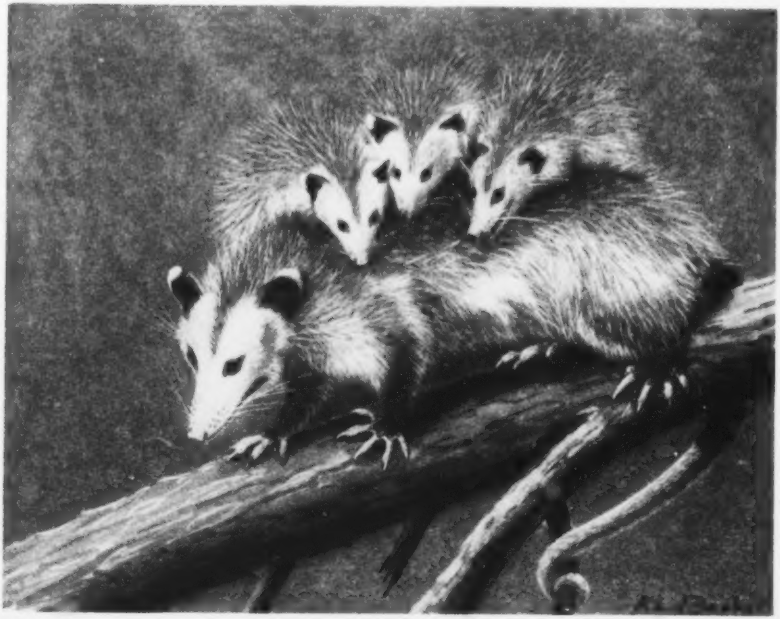


Plate 1. American Opossum, *Didelphis marsupialis.*

American Opossum

Didelphis marsupialis virginiana Kerr

Kerr, Animal Kingdom, p. 193, 1792. Type locality, Virginia, U.S.A.

Description.—Cat size, with long naked tail, large naked ears; hind feet with 5 toes, first large without nail and apposable; head long with slender pointed face. Fur-lined pouch on lower abdomen of female. Colour greyish.

Measurements.—Total length about 32 inches, tail 12 inches, hind foot about 3 inches.

Biology.—Nothing is known of the life-history of opossums at this latitude. Farther south this animal is known to be an omnivorous feeder, eating such foods as fruit, insects, small mammals, and eggs. There are as many as 14 young in a litter, born in a partially developed state after a gestation period of 11 days. They crawl into the pouch by their own activity and remain attached to the nipples for several days. When severely frightened, the opossum assumes a state of shock resulting in feigned death.

Distribution.—The species was introduced on Comaano Island and at Cedro Woolly, Washington, about 1925 and has become established. It has been taken in British Columbia only at Crescent Beach, where two were killed in December, 1949.

KEY TO THE SPECIES OF SHREWS AND MOLES (ORDER INSECTIVORA)

1. Front feet enlarged for digging, more than twice as large as hind feet (Figs. 4 (*a*) and (*b*)); eyes beneath the skin; no external ear pinna; zygomatic arches present (Fig. 5 (*a*)). Moles.

2. Tail more than quarter total length; audital bullæ incomplete and ring-like (Fig. 5 (*c*)); total number of teeth 36. Shrew mole. *Neurotrichus gibbsi.*

2′. Tail less than quarter total length; audital bullæ complete (Fig. 5 (*a*)); total number of teeth 44.

3. Total length less than 190 mm.; greatest length of skull less than 40 mm. Coast mole. *Scapanus orarius.*

3′. Total length greater than 190 mm.; greatest length of skull more than 40 mm. Townsend mole. *Scapanus townsendi.*

1′. Front feet not larger than hind (Fig. 4 (*c*)); very small eyes visible externally; well-developed ear pinna; no zygomatic arches (Fig. 5 (*b*)). Shrews.

4. Total length more than 90 mm.; tail more than 35 mm.; 4 or 5 upper unicuspid teeth visible in profile.

5. Total length more than 140 mm.; hind foot over 18 mm.; hind feet and toes with a margin of short stiff hairs.

6. Upper parts blackish, underparts much paler, usually whitish; tail sharply bicolour. Third upper unicuspid smaller than fourth, greatest cranial breadth 10 mm. or less. Navigator shrew. *Sorex palustris.*

6′. Upper parts and underparts both dark, almost the same colour; tail not bicolour. Third upper unicuspid not smaller than fourth, greatest cranial breadth more than 10 mm. Bendire shrew. *Sorex bendiri.*

5′. Total length less than 140 mm.; hind foot less than 18 mm.; hind feet and toes without margin of stiff hairs.

7. Third upper unicuspid tooth as large as or larger than fourth (Fig. 6 (*a*)).

8. Colour tricolour, dark back sharply set off from paler sides, under parts paler still; maxillary breadth more than 4.6 mm. Saddle-backed shrew. *Sorex arcticus.*

8′. Colour not as above, gradual transition from dark back colour to paler belly; maxillary breadth less than 4.6 mm. Cinereus shrew. *Sorex cinereus.*

7′. Third upper unicuspid tooth smaller than fourth (Fig. 6 (*b*)).

9. Colour lead grey, little if any paler below than above, tail sharply bicolour, white beneath, pale brown above. Trowbridge shrew. *Sorex trowbridgii.*

9′. Colour not as above.

10. Length usually less than 110 mm.; tail usually less than 44 mm.; interorbital breadth less than 3.7 mm. Wandering shrew. *Sorex vagrans.*

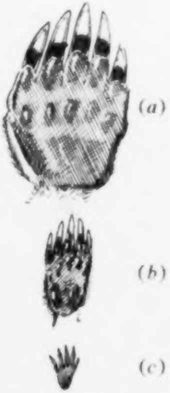


Fig. 4. Ventral views of fore feet of (*a*) mole, (*b*) shrew mole, and (*c*) shrew.

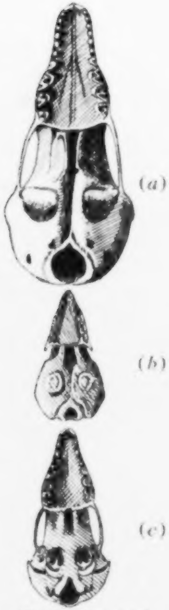


Fig. 5. Ventral view of skulls of (*a*) mole, (*b*) shrew, and (*c*) shrew mole to show zygomatic arch and complete bulla in mole; no zygomatic arch and ring - like bulla in shrew; zygomatic arch and ring - like bulla in shrew mole.

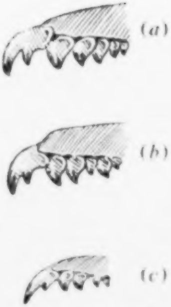


Fig. 6. Front portion of upper tooth row of shrews to show (*a*) third unicuspid larger than fourth, (*b*) third unicuspid smaller than fourth, and (*c*) pygmy shrew.

10′. Length usually greater than 110 mm.; tail usually more than 44 mm.: interorbital breadth 3.7 mm. or more. Dusky shrew. *Sorex obscurus.*

4′. Total length less than 90 mm.; tail less than 35 mm.; though 5 upper unicuspids present, only 3 readily apparent in profile (Fig. 6 (*c*)). Pygmy shrew. *Microsorex hoyi.*

ORDER INSECTIVORA—SHREWS AND MOLES

FAMILY SORICIDÆ—SHREWS

GENUS SOREX—LONG-TAILED SHREWS

Saddle-backed Shrew

Sorex arcticus arcticus Kerr

Kerr, Animal Kingdom, p. 206, 1792. Type locality, Fort Severn, Ontario.

Description.—A medium-sized shrew, total length about 4½ inches. Colour in winter, sides rich dark brown, back black to blackish-brown, underparts greyish-brown, the three colour areas sharply distinct. Tail slightly paler below than above. In summer, pelage of more subdued pattern with back dark brown and abdomen darker than in winter. Skull with third upper unicuspid as large as the fourth and maxillary breadth more than 4.6 mm.

Measurements.—Thirteen adults from the Peace River District: Total length 119.4 mm. (108–125); tail 41.4 mm. (38–42); hind foot 14 mm. (13–14).

Habitat.—Most frequent in marshy areas and along the edges of muskegs.

Biology.—Its young are born during the first half of May; possibly there is more than one litter in the summer. Feeding habits are unknown.

Distribution.—Confined to the Peace River District; specimens from Tupper Creek and Charlie Lake (*see* Map 4).

Bendire Shrew

Sorex bendiri bendiri (Merriam)

Merriam, Trans. Linn. Soc. N.Y. 2:217, 1884. Type locality, 18 miles south-east of Fort Klamath, Klamath County, Washington.

Description.—The largest of the North American shrews with a total length about 6 inches. Colour in winter, dark chocolate brown to fuscous black, slightly paler on abdomen; tail dark brown above and below, feet brown. Hind feet with narrow fringe of bristles bordering toes. Summer pelage paler than winter but still dark brown above and below.

Measurements.—Fourteen specimens from south-western British Columbia: Total length 161 mm. (155–167); tail 72 mm. (65–81); hind foot 19 mm. (18–21).

Habitat.—Wet ground in heavily wooded areas, the banks of sluggish streams, beach debris. They swim well and enter the water freely.

Biology.—Nothing is known of the details of feeding habits or reproduction.

Distribution.—In British Columbia confined to the Fraser River delta area. Specimens from Vedder Crossing, Cultus Lake, Huntingdon, Aldergrove, Peardonville, Point Grey, Mount Seymour, and Port Moody (*see* Map 3).

Cinereus Shrew

Sorex cinereus Kerr

Description.—One of the smallest of the shrews, with a total length of about 5 inches, of which one-third is tail. Fur short, velvety. Tail covered with short fine hairs, tip of tail with black "pencil" tuft. Colour in summer evenly dull pale brown on the back, slightly darker on the rump. Underparts greyish-white, tail brown above, whitish below. In winter pelage similar but back greyer, often darker. External ear about ¼ inch in length and coloured same as head. Small size (total length less than 110 mm.), pale brown or grey colour, and third upper unicuspid tooth same size as or larger than fourth will identify this shrew (*see* Fig. 6).

Habitat.—No specific habitat selection; may be taken almost anywhere in wooded or forested country in its range.

Biology.—Eats all kinds of small invertebrates, such as insects and their larvæ, earthworms, isopods, snails, millipedes, and centipedes. Breed first in mid-May with up to five litters per year. Gestation is probably seventeen days, and the young number up to ten per litter, average six. Their life is usually short, almost all the animals born one summer are dead by August of the following summer.

SUBSPECIES

Sorex cinereus cinereus Kerr

Kerr, Animal Kingdom, p. 206, 1792 as *Sorex arcticus cinereus*. Type locality, Severn Settlement (now Severn), mouth of Severn River, south-west side of Hudson Bay, Ontario.

Distinctions.—Differences from *streatori* are given under that race.

Measurements.—Of thirty adults: Total length 98.5 mm. (92–110); tail 40.5 mm. (37–46); hind foot 12 mm. (11–13).

Distribution.—Inhabits the whole of the Province east of the coastal mountains and also eastward into Ontario. Localities represented: Stonehouse Creek, Atlin, Salmon River, 165 miles north of Fort Nelson, 223 miles north of Fort Nelson, Telegraph Creek, Charlie Lake, Moose River, Indianpoint Lake, Tetana Lake, Hazelton, Kispiox, Wisteria, Stuie, Rainbow Mountains, Chezacut Lake, Lac la Hache, Big Bar Lake, Okanagan, Princeton, Mount Revelstoke, Creston, Vermilion Crossing, Mount Assiniboine, Tornado Pass, Yahk, Cranbrook, Fernie.

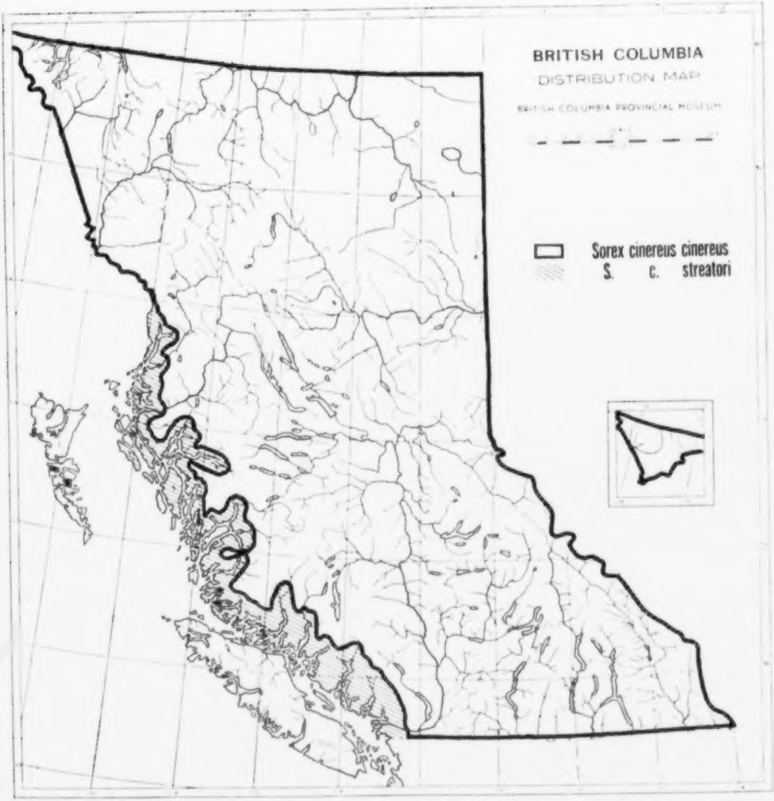
Sorex cinereus streatori Merriam

Merriam, North Amer. Fauna *10*:62, 1895. Type locality, Yakutat Alaska.

Distinctions.—Differs from *cinereus* by darker colour, larger size, longer tail and hind foot, and larger, heavier skull.

Measurements.—Of fifteen adults: Total length 106.6 mm. (102–112); tail 45 mm. (42–50); hind foot 12.5 mm. (12–13).

Distribution.—Occupies the immediate vicinity of the coast-line through the length of the Province, except the lowlands of the Fraser delta region. Localities represented: Observatory Inlet, Port Simpson, Metlakatla, Kimsquit, Eucott Hotsprings, Hagensborg, Neckis River, Lowe Inlet, Koeye River, Rivers Inlet, Gibsons Landing, Alta Lake, Mount Seymour, Sumas, and many of the


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Sorex cinereus cinereus
S. c. streatori

Map 2. Distribution of the Cinereus Shrew, *Sorex cinereus*.

islands north of Vancouver Island (Princess Royal, Yeo, Pitt, Campbell, Townsend, King, Smythe, Hunter, Spider).

Dusky Shrew

Sorex obscurus Merriam

Plate 2. Dusky Shrew, *Sorex obscurus.*

Description.—Medium sized, total length about 4¼ inches. Colour, pale silvery brownish-grey. Tail dark brown above, paler beneath, very scantily haired in adults. Feet usually pale brown but very occasionally white. Summer pelage warm brown above, underparts not very different from winter condition. Third upper unicuspid tooth smaller than fourth. Often most difficult to distinguish from *Sorex vagrans* but in general greater body length, longer tail (more than 43 mm.), and longer hind foot (over 13 mm.) will serve to separate *obscurus.*

Habitat.—This species is widely distributed through wooded areas, and occurs also in marshy and moist locations in the arid parts of south central British Columbia.

Biology.—Food, litter size, and breeding season not known to differ from *S. vagrans.*

SUBSPECIES

Sorex obscurus calvertensis Cowan

Cowan, Proc. Biol. Soc. Wash. *54*:95–108, 1941. Type locality Safety Cove, Calvert Island, British Columbia.

Distinctions.—Smaller than *longicauda* with shorter tail and hind foot, and skull smaller in all parts. Colour much paler summer and winter than either *longicauda* or *insularis.*

Measurements.—Thirteen specimens measured: Total length 121.6 mm. (109–129); tail 54 mm. (52–58); hind foot 14.7 mm. (13–15).

Distribution.—Calvert Island and Banks Island, British Columbia.

Sorex obscurus elassodon Osgood

Osgood, North Amer. Fauna *21*:35, 1901. Type locality Cumshewa Inlet, Moresby Island, Queen Charlotte Islands.

Distinctions.— Similar to *longicauda* in colour, but slightly smaller with shorter tail and hind foot. Closely similar externally to *setosus* but skull with flatter brain case, lower rostrum and less pigment on teeth.

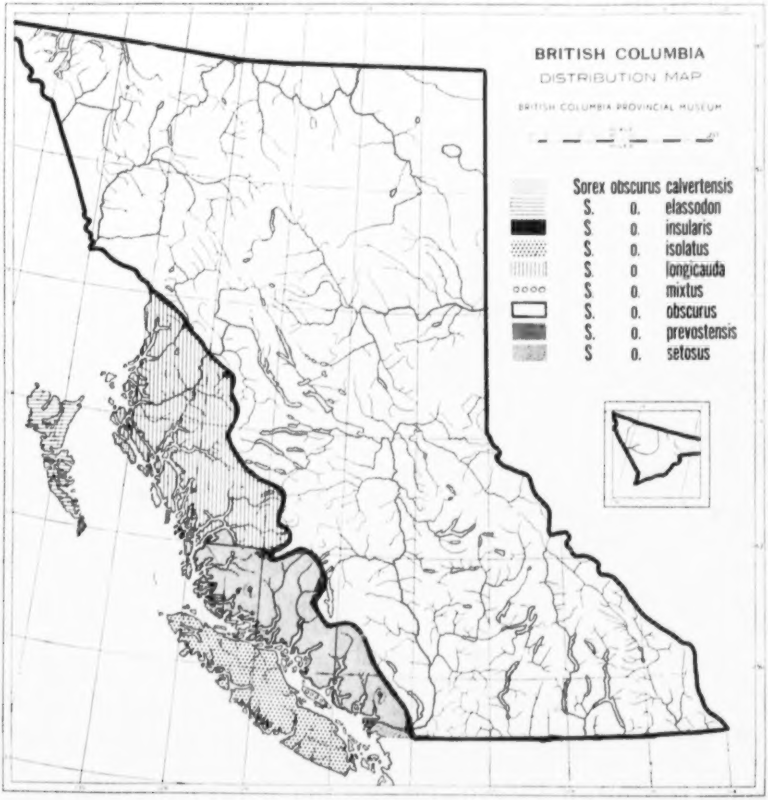
Measurements.— Thirty-three specimens: Total length 122.8 mm. (116–131); tail 51.0 mm. (48–55); hind foot 14 mm. (14–15).

Distribution.— In British Columbia found only on Langara, Graham, Moresby, and smaller adjacent islands in Queen Charlotte Islands. Occurs also on some islands of the Alaskan coast north to Admiralty Island.

Sorex obscurus isolatus Jackson

Jackson, Journ. Wash. Acad. Sci. *12*:263, 1922. Type locality, Nanaimo, Vancouver Island, British Columbia.

Distinctions.— Like *obscurus* in size and *setosus* in colour. Sometimes difficult to distinguish from *S.v. vancouverensis,* but tail over 45 mm., hind foot over 13.5 mm. long, and skull heavier will distinguish it.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Sorex obscurus calvertensis
S. o. elassodon
S. o. insularis
S. o. isolatus
S. o longicauda
S. o. mixtus
S. o. obscurus
S. o. prevostensis
S o. setosus

Map 3. Distribution of the Dusky Shrew, *Sorex obscurus.*

Measurements.—Fifteen specimens measured: Total length 120 mm. (118–127); tail 50 mm. (45–55); hind foot 13.5 mm. (13.5–15).

Distribution.—Known only from Vancouver Island, where it is least abundant in the Gulf Islands Biotic Area and most abundant in the Coast Forest Biotic Area. Localities represented: Colwood, Albert Head, Sahtlam, Duncan, Jordan Meadows, Mount Arrowsmith, Nanaimo, Comox, Upper Campbell Lake, Sayward, Shushartie, Stanley River (Vancouver Island), Quatsino.

Sorex obscurus insularis Cowan

Cowan, Proc. Biol. Soc. Wash. *54*:95–108, 1941. Type locality, Smythe Island, Bardswell Group, British Columbia.

Distinctions.—Differs from the adjacent mainland race *longicauda* in smaller body, shorter tail and hind foot; these are 122 mm. (111–134), 52.6 mm. (46–58), 14.6 mm. (13–15) respectively. The skull is smaller also in greatest length and tooth row. In colour this race has a dark-brown rather than greyish-black winter pelage.

Distribution.—Known only from Townsend, Smythe, and Reginald Islands, British Columbia.

Sorex obscurus longicauda Merriam

Merriam, North Amer. Fauna *10*:74, 1895. Type locality, Wrangell, Alaska.

Distinctions.—Largest race of the species with a length of about 5 inches. Much larger and darker with hind foot and tail longer than *obscurus*. Skull larger in all dimensions. Winter pelage black. Differs from *setosus* in longer tail, darker winter pelage, longer and heavier rostrum, and longer upper tooth row.

Measurements.—Forty eight specimens: Total length 132 mm. (119–144); tail 60 mm. (49–68); hind foot 15.4 mm. (13–17).

Distribution.—Immediate sea-coast and adjacent mountain-slopes from Great Glacier on Stikine River and Port Simpson, south to Kutze Inlet, Koeye River, Rivers Inlet. Intergrades with *setosus* between Rivers Inlet and Powell River. Specimens from Swindle Island, Princess Royal Island, Pitt Island, Campania Island, Hecate

Island, Dufferin Island, Chatfield Island, McCauley Island, Horsfall Island, Yeo Island, Spider Island, Hunter Island, Ruth Island, Goose Island, Granville Channel, Kimsquit, Hagensborg, Stuie, Freeman Pass, Neckis River, Koeye River, Rivers Inlet, Owikeno Lake.

Sorex obscurus mixtus Hall

Hall, Amer. Nat. *72* (742):453–463, 1938. Type locality, Vananda, Texada Island, British Columbia.

Distinctions.—Colour like that of *isolatus* and *setosus;* tail shorter than *setosus;* hind foot and palate smaller than in those races.

Measurements.—Five specimens: Total length 111 mm. (108–117); tail 48 mm. (44–49); hind foot 12 mm. (12–13).

Distribution. — Known only from Texada Island, Strait of Georgia.

Sorex obscurus obscurus Merriam

Merriam, North Amer. Fauna *5*:34, 1891. Type locality, Salmon River Mountains, 10 miles west of Junction, Lemhi County, Idaho.

Distinctions.—Differs from all the coastal subspecies in smaller size and shorter tail.

Measurements.—Ten specimens from the Chilcotin area and Anarchist Mountain measured: Total length 115 mm. (110–122); tail 49 mm. (45–53); hind foot 12.7 mm. (12–13).

Distribution.—Occurs over the whole of the Province east of the Coast Range. West of that range it is represented by other subspecies. Localities of occurrence are: Atlin, 14 miles south and 2 miles east of Kelsall Lake (Baker, 1951), hot springs near junction of Trout and Liard Rivers, Charlie Lake, Flood Glacier, Dokdaon Creek, Stikine River, Hazelton, Kispiox, Eight Mile Mountain, Yellowhead Lake, Tetana Lake, Driftwood River, Sutlet River, Ootsa Lake, Chezacut Lake, Quesnel, Indianpoint Lake, Cottonwood, Mount Revelstoke, Monashee Pass, Vernon, Osoyoos, Skagit, Hope, Anarchist Mountain, Kuskanook, Creston, Cranbrook, Paradise Mine, Vermilion Crossing, Invermere, Assiniboine.

Sorex obscurus prevostensis Osgood

Osgood, North Amer. Fauna *21*:35, 1901. Type locality, Prevost (Kunghit) Island, Queen Charlotte Islands, British Columbia.

Distinctions.—Like *S.o. longicauda* but darker and with shorter tail. Larger and darker than *S.o. elassodon* and with broader rostrum and longer palate.

Measurements.—Nineteen specimens: Total length 128 mm. (121–138); tail 54 mm. (46–58); hind foot 14.6 mm. (14–15).

Distribution.—Confined to Kunghit (formerly Prevost) Island of Queen Charlotte Islands.

Sorex obscurus setosus Elliot

Elliot, Field Columb. Mus., Publ. *32*, Zool. Ser. *1*:274, 1899. Type locality, Happy Lake, Olympic Mountains, Clallam County, Washington.

Distinctions.—Similar to *S.o. obscurus*, from which it differs in darker colour both summer and winter, longer tail, larger hind foot; skull longer and slightly narrower interorbitally.

Measurements.—Forty-five specimens: Total length 122 mm. (113–127); tail 55 mm. (50–61); hind foot 13.6 mm. (13–14.5).

Distribution.—South-west corner of the Province, west of the summit of the Coast Range. Representative localities: Chilliwack, Vancouver, Agassiz, Squamish, Alta Lake, Lund, Lihumitson, Huntingdon, Brackendale, Stuart Island, Horseshoe Lake near Powell River, Loughborough Inlet, Bute Inlet, Kingcome Inlet. The population on Point Grey, Vancouver, demonstrates complete intergradation between this subspecies of *obscurus* and *Sorex v. vagrans,* suggesting conspecificity.*

Navigator Shrew

Sorex palustris Richardson

Description.—Size large, exceeded only by *S.b. bendiri.* Colour of back blackish to blackish-grey intermingled with silvery hairs.

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* Since this was in type, J. S. Findley (Univ. Kansas Publ. Mus. Nat. Hist. *9* (1):1–68) has proposed regarding *S. vagrans* and *S. obscurus* as the same species. This will make all the subspecies of *S. obscurus* subspecies of *S. vagrans*. *S.v. monticola* is restricted by him to a range in Arizona.

Underparts silvery white or grey, tail bicolour, dark on top, white beneath. Feet whitish, conspicuously fringed with silvery hair.

Habitat.—Frequents small streams and lake margins, particularly where streams leave or enter.

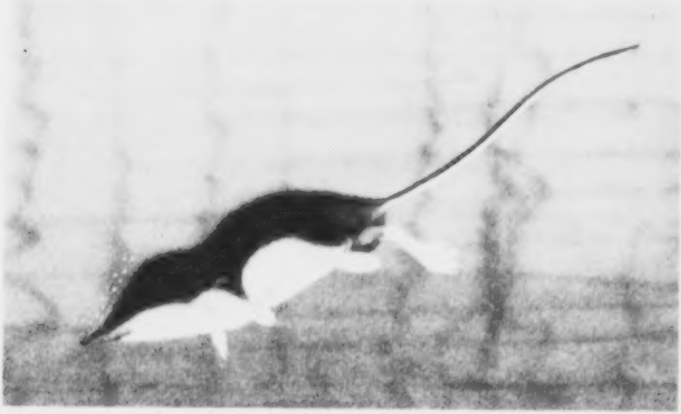


Plate 3. Navigator Shrew, *Sorex palustris.*

Biology. — Feeds very actively under water upon insects, invertebrates, and small fish. Nothing is known of its reproductive biology or life-history.

SUBSPECIES

Sorex palustris brooksi Anderson

Anderson, Canad. Field-Nat. *48*:134–135, 1934. Type locality, Black Creek, Comox District, Vancouver Island, British Columbia.

Distinctions. — Like *S.p. navigator* except underparts smoky grey or brown. Measurements as in next subspecies.

Distribution.—Occurs only on Vancouver Island. Records of occurrence: Millstream near Victoria, Comox, Quatsino. Only three specimens known to science.

Sorex palustris navigator (Baird)

Baird, Mammals, in Rep. Expl. Surv. Railr. to Pacific, *8* (Pt. 1):11, 1857. Type locality, near head of Yakima River, Cascade Mountains, Kittitas County, Wash.

Distinctions.—Underparts silvery white.

Measurements.—Thirty-two adults of both sexes: Total length 161 mm. (151–193); tail 78 mm. (69–107); hind foot 20 mm. (19–21). Two specimens weigh 11.5 grams each.

Distribution.—Ranges over the entire Province from the alplands at 6,500 feet in the Rocky Mountains to sea-level at Powell River and from the alpine arctic regions to the Okanagan Valley at Vernon. Does not occur in the estuary of the Fraser River west of Hope. Localities of occurrence: Atlin, Stonehouse Creek, Telegraph Creek, Tupper Creek, Wistaria, Chezacut Lake, Neckis River, Hagensborg, Bootahnie, Seton Creek, Alta Lake, Powell River, Seymour Mountain, Cultus Lake, Hope–Princeton summit, Coldstream (Vernon), Paradise Mine (near Invermere), Vermilion Crossing, Mount Assiniboine, Tornado Pass, Bridesville, Rossland, Yahk.

Trowbridge Shrew

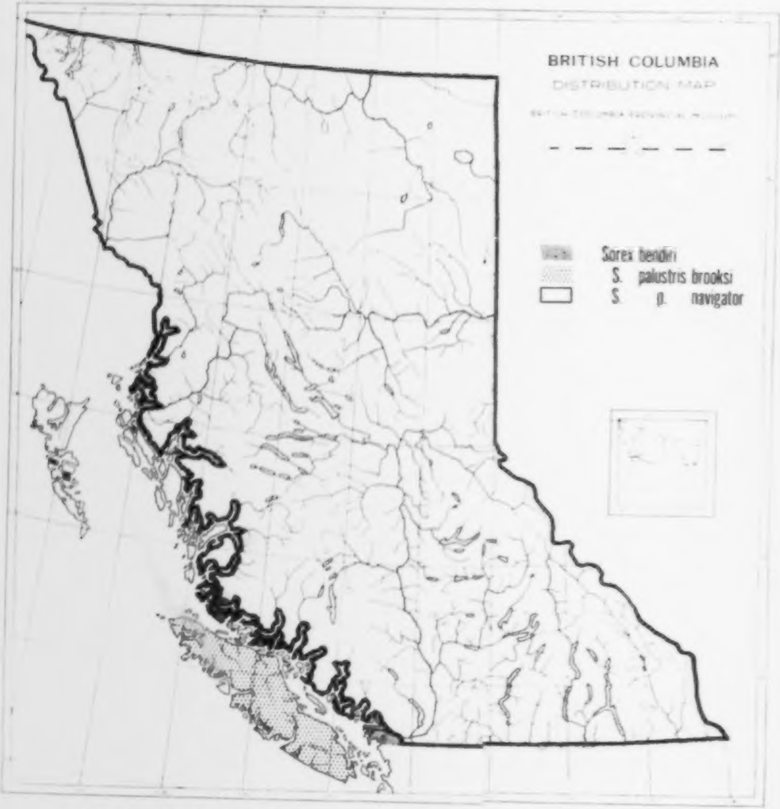
Sorex trowbridgii trowbridgii Baird

Baird, Mammals, in Rep. Expl. Surv. Railr. to Pacific, *8* (Pt. 1):13, 1857. Type locality, Astoria, mouth of Columbia River, Clatsop County, Oregon.

Description.—A medium-sized shrew, total length about 4½ inches. Colour a uniform dark bluish-grey, sometimes sooty grey, underparts scarcely paler than sides. Tail brown above, white below; feet white; slightly more brownish in summer and juvenal pelage.

Measurements.—Twenty-six specimens from Huntingdon and Cultus Lake measured: Total length 119 mm. (109–125); tail 55 mm. (48–58); hind foot 13.5 mm. (13–15).

Distinctions.—The distinctive colour, sharply bicolour tail and white feet make identification of this shrew easy.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Sorex bendiri
S. palustris brooksi
S. p. navigator

Map 4. Distribution of the Bendire Shrew, *Sorex bendiri*, and of the Navigator Shrew, *Sorex palustris*.

Habitat.—In its British Columbia range this shrew inhabits dense coniferous forests and adjacent wooded areas generally at low elevations but extending up almost to timber-line.

Biology.—Food mainly insects and isopods of the forest floor. Little is known of its reproduction; the first litter is born in late April or early May.

Distribution. — Confined to the forested parts of the Puget Sound lowlands, south of Burrard Inlet. Specimens from Huntingdon, Sumas, Chilliwack, Hope, Cultus Lake, Vancouver.

Wandering Shrew

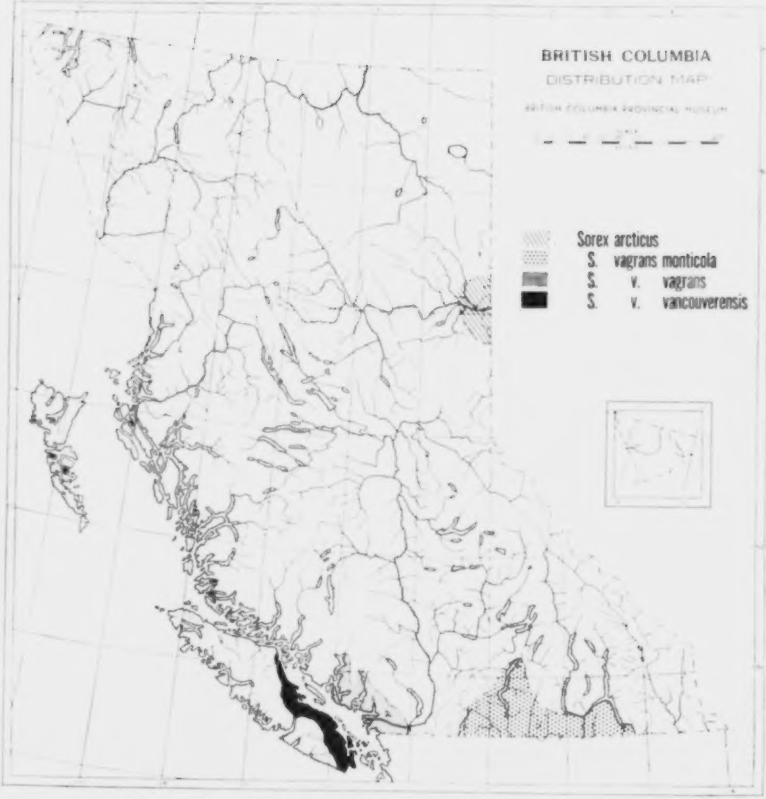
Sorex vagrans Baird

Description.—Size small, less than 4½ inches. Strikingly different summer and winter pelages. Winter, sooty or fuscous black often flecked with whitish hairs; ears brownish; underparts silvery grey often with light buff wash; tail brown above and below; feet brownish. Summer, pale brownish, sides same or slightly paler, underparts pale greyish with light-brown wash; tail and feet as in winter; face in front of eyes sooty. Fourth upper unicuspid markedly smaller than third (*see* Fig. 6.) Total length less than 112 mm. and tail less than 48 mm. will serve to distinguish most specimens. In certain areas near Vancouver and in the range of the race *monticola* it is not possible to distinguish all specimens of this species from some specimens of *Sorex obscurus.*

Habitat.—Inhabits marshy areas and damp places in almost all cover types.

Biology.—Mating activity begins in January and February, with litters arriving from March throughout the summer. However, there is a rapid loss of the adult females, and it is doubtful if most of them produce more than two litters before dying. The population born one year is almost entirely eliminated by August of the following year. Embryos three to eight, average six.

Food consists of earthworms, insects of all kinds, and small salamanders. A captive individual weighing 6.5 grams ate an average of 8.36 grams of food per day for eight days (Broadbooks, Murrelet *20*:65).


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Sorex arcticus
S. vagrans monticola
S. v. vagrans
S. v. vancouverensis

Map 5. Distribution of the Saddle-backed Shrew, *Sorex arcticus*, and of the Wandering Shrew, *Sorex vagrans*.

SUBSPECIES

Sorex vagrans monticola Merriam

Merriam, North Amer. Fauna *3*:43, 1890. Type locality, San Francisco Mountain, Coconino County, Arizona.

Distinctions.—Differs from *vagrans* in greater length, longer tail and distinctly paler, more greyish coloration, particularly in winter pelage. It is difficult to distinguish this race from *Sorex obscurus* that occurs in the same localities. The shorter tail is probably the most reliable criterion, but some specimens cannot be separated.

Measurements.—Nine specimens measured: Total length 103 mm. (97–110); tail 42 mm. (40–45); hind foot 13 mm. (12.5–14).

Distribution.—The southern part of the Province east of the Coast Range. Representative localities: Princeton, Vernon, Trail, Cascade, Creston.

Sorex vagrans vagrans Baird

Baird, Mammals, in Rep. Expl. Surv. Railr. to Pacific, *8* (Pt. 1):15, 1857. Type locality, Shoalwater Bay, Pacific County, Washington.

Distinctions.—Darker in colour than *monticola*, with broader brain case and shorter tooth row.

Measurements. — Sixteen specimens from the Fraser delta measured: Total length 107 mm. (99–112); tail 43 mm. (39–48); hind foot 12.3 mm. (11–13.5).

Distribution.—Confined to the lower elevations along the coast north as far as Jervis Inlet. Representative localities: Hope, Chilliwack, Huntingdon, Vancouver, Bowen Island, Powell River.

Sorex vagrans vancouverensis Merriam

Merriam, North Amer. Fauna *10*:70, 1895. Type locality, Goldstream, Vancouver Island, British Columbia.

Distinctions.—Like *vagrans* but darker, upper parts and underparts in winter browner than in *vagrans;* in summer pelage more reddish-brown above and below than that race.

Measurements.—Nine specimens averaged: Total length 108 mm. (97–115); tail 43 mm. (40–45); hind foot 12 mm. (11–13).

Distribution.—Occurs on Vancouver Island south of Sayward, particularly in the Gulf Islands Biotic Area of the east side; also on some adjacent islands in the Gulf of Georgia. Locality records: Victoria, Sooke, Sahtlam (Cowichan Valley), Alberni, Sproat Lake, Errington, Nanaimo, Parksville, Comox, Sayward, Saltspring Island, South Pender Island, Saturna Island.

GENUS MICROSOREX—PYGMY SHREWS

Pygmy Shrew

Microsorex hoyi intervectus Jackson

Jackson, Proc. Biol. Soc. Wash. *38*:125, 1925. Type locality, Lakewood, Oconto County, Wisconsin.

Description.—The smallest of all North American mammals. Total length about 3¼ inches. Colour almost as in the *cinereus* shrew; in winter greyish-brown above, paler on sides and greyish-white underneath. Summer pelage browner.

Measurements.—Eight specimens from British Columbia measured: Total length 81 mm. (73–88); tail 26 mm. (22–29); hind foot 10 mm. (8–12).

Distinctions.—The small size, short tail, and distinctive unicuspid teeth (*see* Fig. 6) are diagnostic.

Habitat.—Specimens have been taken in willow thickets on lake edges, in open spruce forest near water, and in aspen parkland near water.

Biology.—Nothing is known of the life-history of this shrew.

Distribution.—The north-eastern and central parts of the Province. Specimens have been taken at Fort St. John, Telegraph Creek, Ootsa Lake, Vanderhoof (Munro, 1955), Nulki Lake, Chimney Lake, Anahim Lake, Chezacut Lake, Hazelton, Pass Lake, Vermilion Crossing.

FAMILY TALPIDÆ—MOLES
GENUS SCAPANUS—WESTERN MOLES

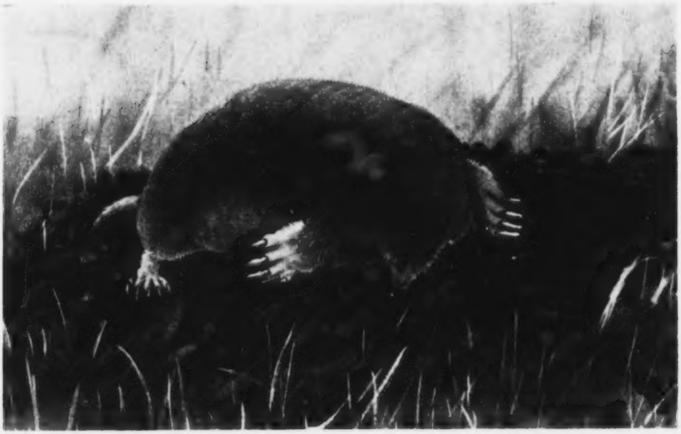


Plate 4. Townsend Mole, *Scapanus townsendi.*

Townsend Mole
Scapanus townsendi (Bachman)

Bachman, Journ. Acad. Nat. Sci. Phila. *8* (1):58, 1839. Type locality, near Vancouver, Clark County, Washington.

Description.—The fur, like that of the Coast mole, all of one length instead of separable into guard hairs and underfur; this imparts a velvety appearance. Colour in winter almost black, in summer slightly paler. Tail and tip of the long pointed nose flesh pink in colour and almost naked. Large flat fore feet each bearing five strong flattened claws are whitish in colour and almost hairless and are normally held with the palms directed outward and slightly downward, the animal walking on the edges of the feet. Eyes are present and structurally perfect but are beneath the skin and probably have no visual function.

Measurements.—Average measurements of seven adult males from Huntingdon are total length 210 mm. (202–218); tail 40 mm. (35–55); hind foot 25 mm. (24–26). Five adult females measured: Total length, 207 mm. (202–217); tail 42 mm. (40–43); hind foot 25.5 mm. (24.5–27).

Distinctions.—The Townsend mole occurs in the same region of British Columbia as is occupied by the Coast mole, but the two are easily separable on size alone. Adult *S. townsendi* always measure more than 190 mm. total length, while *S.o. orarius* adults measure less than that figure. Similarly, the greatest length of skulls of *townsendi* exceeds 40 mm. while skulls of adult *orarius* are always smaller than that. Young Townsend moles as well as adults may be distinguished from Coast moles of any age by their relatively broader fore feet with heavier claws.

Habitat.—This species occurs in the cultivated fields and open brushland where soil is deep and fairly loose with little gravel content.

Biology.—This mole is almost completely subterranean and largely nocturnal; its food consists of earthworms and ground inhabiting insects; it occasionally eats soft roots. Breeding takes place in February and young number two to four; apparently there is just one litter per year.

Distribution.—The Townsend mole has a very limited distribution in Canada where it crosses the International Boundary only for a mile or two in the vicinity of Huntingdon in the lower Fraser Valley. The range of the species extends south along the Pacific coastal slope from British Columbia to extreme north-western California.

Coast Mole

Scapanus orarius orarius True

True, Proc. U.S. Nat. Mus. *19*:52, 1896. Type locality, Shoalwater Bay, Pacific County, Washington.

Description.—In winter pelage, upper parts deep mouse grey with a velvety sheen sometimes imparting a silvered appearance. Underparts paler and less glossy. In summer the fur often has a brownish cast. Front feet much as in *townsendi* but not so broad and with more slender claws. Tail sparsely haired and pinkish in colour. Tip of nose naked and pink. Eyes present but beneath the skin and functionless.

Measurements.—Average measurements of eleven adult males are total length 163 mm. (150–179); tail 34 mm. (29–38); hind foot 21 mm. (19–23); and of nine adult females, total length 161.5 mm. (149–174); tail 33 mm. (30–39); hind foot 20 mm. (19–21).

Habitat.—The Coast mole inhabits a wide variety of soil types. It is most abundant in cultivated ground and in pastures but is found also in second-growth forests and even in mature conifer forests. It is often found in gravelly soils.

Biology.—Almost entirely subterranean, but active through the day as well as at night; mole skulls in owl pellets testify to occasional excursions on the surface. Food is mainly earthworms and insects; the mating season begins in late January; there are from two to five young per litter.

Distribution.—Found throughout the Puget Sound Lowlands faunal area north to Vancouver City and Agassiz on the north side of the Fraser River. Has not crossed Burrard Inlet on to its north shore. Ranges up the Fraser Valley at least as far as Boston Bar. Specimen records from Alluvia, Vancouver, New Westminster, Huntingdon, Peardonville, Agassiz, Hope, Vedder Crossing, Pitt Meadows. The range of the species *S. orarius* extends along the coastal slope from British Columbia to northern California.

GENUS NEUROTRICHUS—SHREW MOLES

Shrew Mole

Neurotrichus gibbsi (Baird)

Baird, Mammals in Rep. Expl. Surv. Railr. to Pacific, *8* (Pt. 1):76, 1857. Type locality, White River Pass north of Mount Rainier, Pierce County, Washington.

Description.—A small mole about 4½ inches in total length including the tail of 1½ inches. Fur short but not plush-like; colour almost black all over; tail slightly narrowed at base with longish hairs in rings; nose long extending about ⅜ inch in front of mouth; eyes very small. Fore feet hand-like, one and one-half times the size of hind feet, with long slender sharp claws. No external ear pinna. The short, fat, hairy tail is unique and will distinguish this mole from all near relatives.

Habitat.—Lives largely underground in deep soft woodland soil. Frequently makes networks of small burrows under logs. Forages on the surface more frequently than the larger moles.

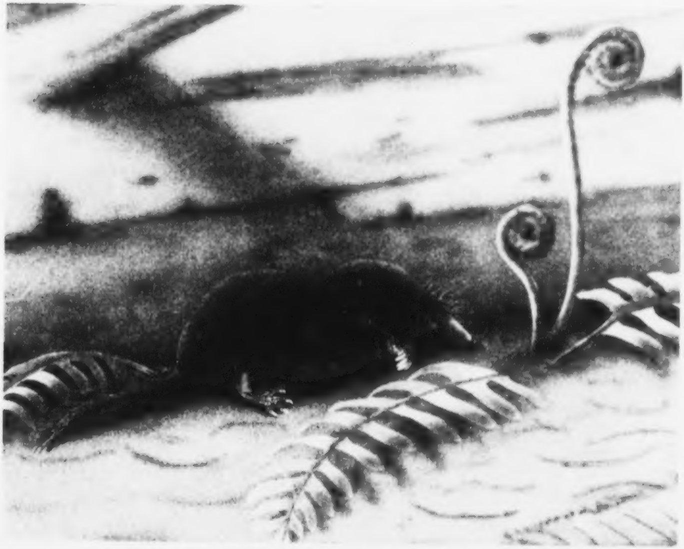


Plate 5. Shrew Mole, *Neurotrichus gibbsi.*

Biology.—Food largely earthworms, isopods, and insect larvæ and pupæ. Young, one to four, born in March and possibly later as nursing females have been taken in September.

Distribution.—Confined to the Puget Sound Lowlands north along the coast to Roberts Creek; east to Mile 42 on Hope–Princeton Highway. Outside the Province it inhabits the coastal slope south to central California.

SUBSPECIES

Neurotrichus gibbsi gibbsi (Baird)

Baird, Mammals in Rep. Expl. Surv. Railr. to Pacific, *8* (Pt. 1):76, 1857. Type locality, Naches Pass, 4,500 feet, Pierce County, Washington.

Distinctions.—Larger than the next race, with longer tail and hind foot and foreclaws noticeably heavier.

Measurements.—All adults taken between January and June, twenty specimens: Total length 119 mm. (113–125); tail 40 mm. (37–45); hind foot 16.5 mm. (16–18.5).

Distribution.—Specimens from Allison Pass (Mile 42), Mile 20 on Hope–Princeton Highway, Lihumitson Mountain, North Vancouver, Vancouver, Roberts Creek. The Vancouver specimens show some approach to *minor*.

Neurotrichus gibbsi minor Dalquest and Burgner

Dalquest and Burgner, Murrelet *22*:12, 1941. Type locality, Seattle, Washington.

Distinctions.—Smaller size, shorter tail and hind foot; foreclaws noticeably weaker.

Measurements.—All adults, taken in March to June, sexes the same, nineteen individuals: Total length 111 mm. (106–116); tail 36 mm. (29–41); hind foot 15.5 mm. (15–16.5).

Distribution.—This is the lowland race occupying the Puget Sound Lowlands south of the Fraser River. Localities represented: Cultus Lake, Vedder Crossing, Huntingdon, Thurston, Douglas, Crescent Beach.

KEY TO THE SPECIES OF BATS (ORDER CHIROPTERA)

1. Tail extending conspicuously behind interfemoral membrane (Fig. 7 (*a*)). Big free-tailed bat. *Tadarida macrotis.*

1′. Not so (Fig. 7 (*b*) and (*c*)).

2. Interfemoral membrane completely furred; size very large. Hoary bat. *Lasiurus cinerea.*

2′. Not so.

3. Dorsal hairs silver-tipped, colour dark chocolate brown. Silver-haired bat. *Lasionycteris noctivagans.*

3′. Not so.

4. Total number of teeth thirty-two; colour even reddish-brown. Big brown bat. *Eptesicus fuscus.*

4′. Total number of teeth in excess of thirty-two; colour not reddish-brown.

5. Ear from meatus over 15 mm.

6. Ear from meatus 15 to 23 mm.

7. Interfemoral membrane with conspicuous fringe of bristles; forearm 40 mm. or more; maxillary breadth at M*3* more than 6.3 mm. Fringed myotis. *Myotis thysanodes.*

7′. Interfemoral membrane with inconspicuous fringe of bristles; forearm 40 mm. or less; maxillary breadth at M*3* less than 6.3 mm.

8. Ear from meatus more than 18 mm.; greatest length of skull more than 15 mm. Long-eared myotis. *Myotis evotis.*

8′. Ear from meatus less than 18 mm.; greatest length of skull 15 mm. or less. Keen myotis. *Myotis keeni.*

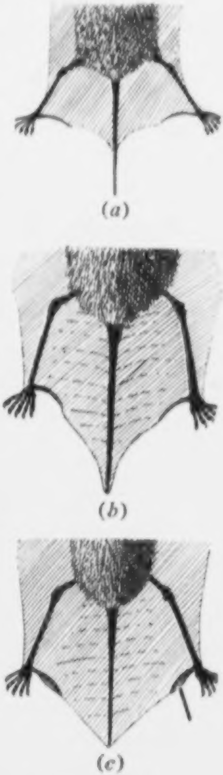
6′. Ear from meatus more than 24 mm.

9. Forearm less than 48 mm.; well developed glandular swelling on each side of muzzle (Fig. 8); incisors ⅔, premolars ⅔. Western big-eared bat. *Corynorhinus rafinesqui.*

9′. Forearm more than 48 mm.; small glandular swellings on each side of muzzle; incisors ½, premolars ⅔. Pallid bat. *Antrozous pallidus.*

5′. Ear less than 15 mm.

10. Tail length more than 41 mm.; ratio of tail length to body length about 92 per cent; calcar with keel (Fig. 7 (*c*)); underside of



(*a*)

(*b*)

(*c*)

Fig. 7. Interfemoral membranes of bats.

wing furred to level of elbow. Long-legged myotis. *Myotis volans.*

10′. Tail length 41 mm. or less; ratio of tail length to body length about 80 per cent or less; calcar without keel (Fig. 7 (*b*)); underside of wing not furred to elbow.

11. Length of hind foot 5 to 6 mm.

12. Colour yellowish to olive; face and ears black. Small-footed myotis. *Myotis subulatus.*

12′. Colour chestnut to darker; face and ears brown. California myotis. *Myotis californicus.*

11′. Length of hind foot 7 to 10 mm.

13. Fur of back with glossy sheen; greatest length of skull more than 15 mm. Little brown myotis. *Myotis lucifugus.*

13′. Fur of back dull; greatest length of skull less than 15 mm. Yuma myotis. *Myotis yumanensis.*

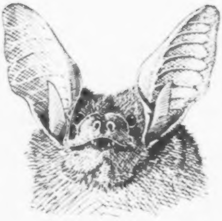


Fig. 8. Head of lump-nosed bat to show large ears and swellings on nose.

ORDER CHIROPTERA—BATS

FAMILY VESPERTILIONIDÆ—COMMON BATS

GENUS CORYNORHINUS—LUMP-NOSED OR BIG-EARED BATS

Western Big-eared Bat

Corynorhinus rafinesqui (Lesson)

Description.—Length about 4 inches and thus medium sized among the bats of Canada. Colour greyish-brown without lustre; exceptionally long narrow ears, extending more than 1 inch from the notch. Upper side of snout in front of eyes with a pair of prominent bumps or ridges. Thirty-six teeth (2/3, 1/1, 2/3, 3/3).

Habitat. — Found in open-type dry forest, where it has an affinity for caves and old mine shafts as roosting-places.

Biology.—Young, usually single, born in mid-July. Young and old hibernate at latitudes as far north as Williams Lake.

SUBSPECIES

Corynorhinus rafinesqui intermedius Grinnell

H. W. Grinnell, Univ. California Publ. Zool. *12*:320, 1914. Type locality, Auburn, Placer County, California.

Distinctions.—Paler in colour than the next race and with larger feet.

Measurements.—Fifteen specimens of both sexes: Total length 102 mm. (95–108); tail 45 mm. (39–52); hind foot 11.3 mm. (9–12); wing-spread 296 mm. (285–305).

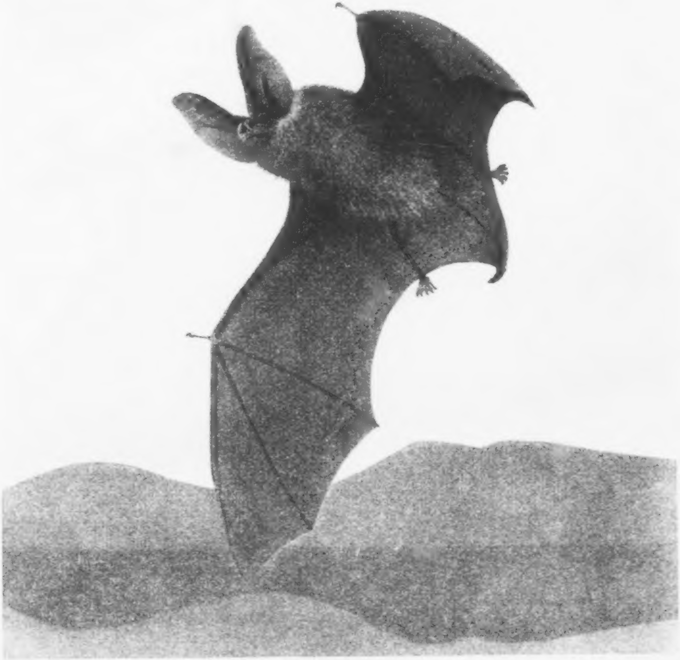
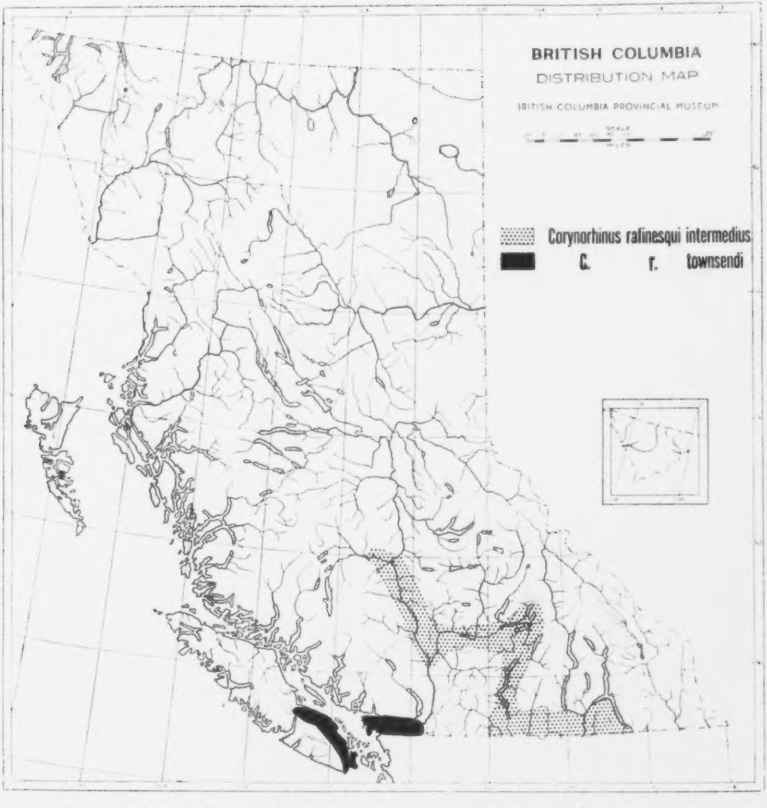


Plate 6. Western Big-eared Bat, *Corynorhinus rafinesqui.*

Distribution.—Specimens from Adams River, Williams Lake, Riske Creek, Salmon Arm, Armstrong, Okanagan Landing, Oliver, West Creston, Kootenay River near Creston, Keremeos.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
▨ Corynorhinus rafinesqui intermedius
■ C. r. townsendi

Map 6. Distribution of the Western Big-eared Bat, *Corynorhinus rafinesqui*.

Corynorhinus rafinesqui townsendi (Cooper)

Cooper, Ann. Lyc. Nat. Hist. New York *4*:73, 1837. Type locality, Columbia River, Oregon.

Distinctions.—Dark brownish-grey, noticeably darker than *intermedius;* hind feet slightly smaller.

Measurements.—Seven specimens of both sexes: Total length 101 mm. (94–107); tail 45 mm. (43–48); hind foot 10 mm. (8–11); wing-spread 302 mm. (245–308).

Distribution.—South coastal British Columbia, including Vancouver Island. Not known north of the Strait of Georgia region. Records are from Comox, Nanaimo, Lake Cowichan, Newcastle Island, Beaver Creek, Victoria on Vancouver Island, and Sumas Lake and Hope on the mainland.

GENUS EPTESICUS—BIG BROWN BATS

Big Brown Bat

Eptesicus fuscus (Beauvois)

Description.—The even rusty red colour (almost cinnamon), along with black ears and wing membranes, and the large size of this bat are distinctive. The ears are of medium size, and in general this species lacks any peculiarly distinctive characteristics of form. Thirty-two teeth (2/3, 1/1, 1/2, 3/3).

Habitat.—The species inhabits a wide variety of forests, mostly at low elevations.

Biology.—The big brown bat roosts during daylight hours in small colonies including both sexes. It may occupy cavities in trees, caves, and crevices among rocks, and often buildings. It hibernates at Williams Lake in the wall of a building. One or two young are born in July and may be of different ages in any one colony. This is one of the earliest bats on the wing, appearing just at twilight.

SUBSPECIES

Eptesicus fuscus bernardinus Rhoads

Rhoads, Proc. Acad. Nat. Sci. Phila. *53*:619, 1902. Type locality, near San Bernardino, San Bernardino County, California.

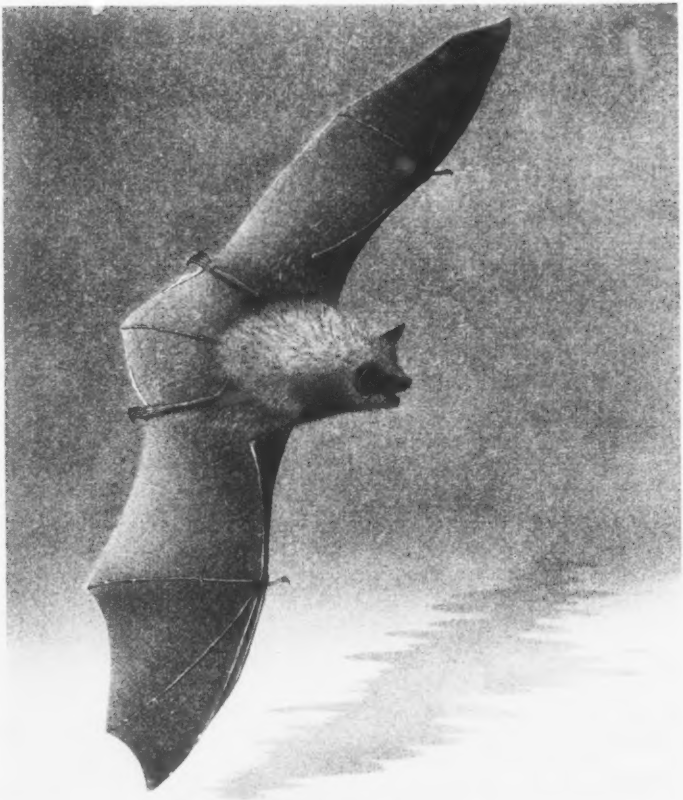


Plate 7. Big Brown Bat, *Eptesicus fuscus.*

Distinctions.—Dull brown with an almost clay-coloured cast. lustreless and completely lacking the bright cinnamon shade of ***pallidus.***

Measurements.—Eleven specimens of both sexes: Total length 120 mm. (115–127); tail 48 mm. (43–52); hind foot 12 mm. (11–14); wing-spread 355 mm. (341–393).

Distribution.—The south-western corner of the Province. Specimens from Horseshoe Lake, Brackendale, Howe Sound, Hope, Hope–Princeton Road, Chilliwack Valley, Vancouver, Huntingdon, Esquimalt, Victoria. There are specimens from southern Vancouver Island, taken during migration, that appear to be of the next race.

Eptesicus fuscus pallidus Young

Young, Proc. Acad. Nat. Sci. Phila. *60*:408, 1908. Type locality, Boulder, Boulder County, Colorado.

Distinctions. — Bright cinnamon brown in colour, ears and membranes black. There is a considerable degree of individual variability in the hue of brown represented in any locality.

Measurements. — Ten specimens: Total length 120.5 mm. (114–131); tail 50 mm. (42–54); hind foot 12 mm. (10–14); wing-spread 335 mm. (317–356).

Distribution. — The greater part of the southern half of the Province east of the Coast Range; in general confined to areas of parkland, open forest, or clearings at lower elevations. Localities represented: Charlie Lake, Stuie, Chimney Lake, Williams Lake, Kamloops, Vernon, Vaseux Lake, Oliver, Anarchist Mountain, Whitewater Ranch, Goodfellow Creek.

GENUS LASIONYCTERIS—SILVER-HAIRED BATS

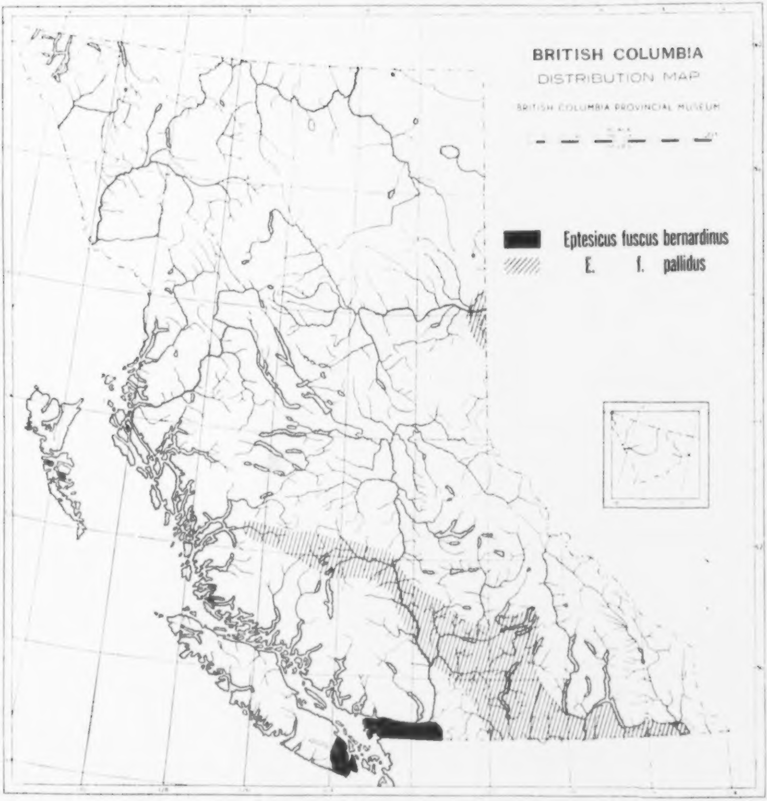
Silver-haired Bat

Lasionycteris noctivagans (LeConte)

LeConte, in McMurtrie, The Animal Kingdom . . ., by Cuvier, *1*:431, 1831. Type locality, Eastern United States.

Description. — A medium-sized bat evenly dark chocolate brown all over, with the hair tips, particularly those of the back, tipped with white; wing membranes brown and bearing fur to the elbows, interfemoral membrane furred. Thirty-six teeth (2/3, 1/1, 2/3, 3/3).

Measurements. — Twenty-one specimens measured: Total length 103 mm. (97–109); tail 42 mm. (39–50); hind foot 10 mm. (9–11); wing-spread 299 mm. (281–312).


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
■ Eptesicus fuscus bernardinus
▨ E. f. pallidus

Map 7. Distribution of the Big Brown Bat, *Eptesicus fuscus*.

Habitat.—Specimens have been taken in almost all forested areas from the sea-coast to elevations of 5,000 feet.

Biology.—Usually a solitary species dwelling under the loose bark of trees, in cavities in trees, beneath loose planks on an old building, and other similar locations. Several have been found hibernating under the loose bark of cedars at Vancouver, but this bat is believed to migrate from the colder parts of its range in the winter. This is the earliest flying of all our bats, frequently appearing just after sunset but still in broad daylight. One or two young are born in July.

Plate 8. Silver-haired Bat, *Lasionycteris noctivagans.*

Distribution.—Found across the southern half of the Province north to Charlie Lake. Specimen records are from: Charlie Lake, Tatletuey Lake, Driftwood Mountains, Omineca Mountains, Kiskagus Creek, Bear Lake, Wolf Lake, Tetana Lake, Wistaria, Cottonwood, Masset, Queen Charlotte City, Princess Royal Island, Goose Island, Mount Brilliant, Chimney Lake, Chezacut Lake, Pass Lake near Kamloops, Azure Lake, Alta Lake, Bute Inlet, Cultus Lake, Vancouver, Creston.

GENUS ANTROZOUS—PALLID BATS

Pallid Bat

Antrozous pallidus cantwelli Bailey

Bailey, North Amer. Fauna 55:391, 1936. Type locality, Rogersburg, Asotion County, Washington.

Description.—A large pale-coloured bat with very large ears (over 26 mm. in length). Dorsal colour dull buffy drab washed with smoky brown, underparts creamy buff. Likely to be confused only with the big-eared bat. It can be distinguished as follows: Nose relatively long and without the swollen lumps between eye and muzzle; ear more than half as broad as high; inner edge of ear not folded back into a double rim; small keel on the calcar; underparts nearly white.

Measurements.—Only one specimen known from British Columbia, an adult male: Total length 110 mm.; tail 48 mm.; hind foot 13.5 mm.; wing-spread 370 mm.

Distribution.—The single specimen was taken in a stone-pile by the roadside 3 miles north of Oliver.

GENUS LASIURUS—TREE BATS

Red Bat

Lasiurus borealis teliotus (H. Allen)

Allen, Proc. Amer. Philos. Soc. 29:5, 1891. Type locality, probably California.

Description.—A very distinctive species, varying from chestnut to bright rusty red in colour, with faint silver tipping on the dorsal hairs; small rounded ears; the tail membrane fully furred above.

Measurements.—Total length about 112 mm.; tail 49 mm.; hind foot 9.2 mm.; wing-spread 320 mm.; weight 12 grams.

Distribution. — One specimen in the National Museum of Canada from Skagit. This was probably a wanderer, for the species is unknown in the States immediately south of us.

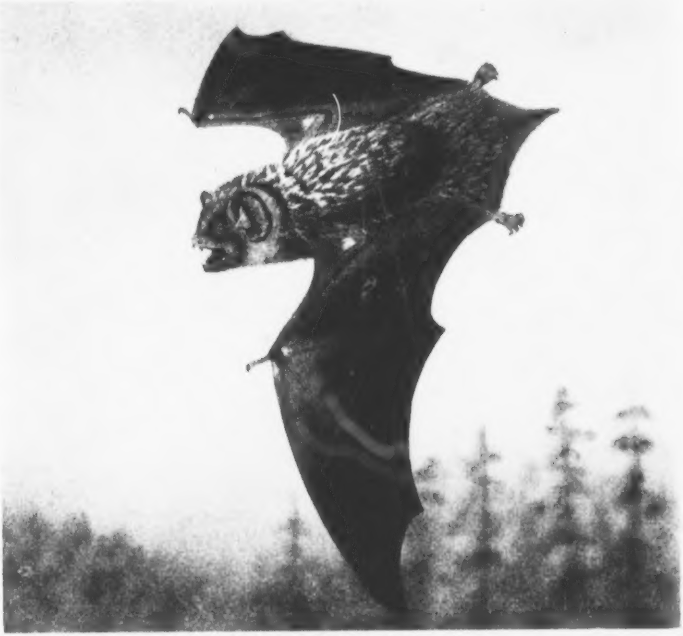


Plate 9. Hoary Bat, *Lasiurus cinereus.*

Hoary Bat

Lasiurus cinereus (Beauvois)

Beauvois, Catal. Raisonné Mus. Peale, Phila., p. 18, 1796. Type locality, Philadelphia, Pennsylvania.

Description. — The largest of the Canadian bats, reaching a length of 5½ inches and a wing-spread of about 16 inches. The colour is striking and distinctive. Back hairs are dark at the base, then yellow, then dark brown, and finally are tipped with silvery white. The effect is of a dull brown bat with bright silver wash. Ears are short, broad, and evenly rounded, furred almost to the tip and rimmed with black. The wings are furred to the wrist, and the upper surface of the interfemoral membrane is thickly furred. The underparts are paler and with less silver tipping. The wings are long, narrow, and dark brown with yellowish-brown leading edge and strip along fingers.

Measurements.—Six specimens: Total length 136 mm. (130–144); tail 60 mm. (55–66); hind foot 12.5 mm. (10–15); wing-spread 403 mm. (384–415).

Habitat.—Most of the specimens taken are found hanging in orchard trees, but one was found in an abandoned woodpecker nest cavity in a tall dead tree. They fly rather late in the evening in forested country; flight is high and rapid.

Biology.—Young, up to four in number, are born in June and early July. The species is migratory, moving south from the Province about mid-August.

Distribution.—Few specimens have been taken, and all of these have been from the extreme southern parts of the Province: Alta Lake, Vancouver, Huntingdon, Victoria, and various points in the Okanagan Valley.

GENUS MYOTIS—LITTLE BATS OR MYOTES

California Myotis

Myotis californicus (Audubon and Bachman)

Description.—One of the two smallest bats in the Province. Colour variable, usually rich dark chestnut, but some adults and all young are darker and duller, to fuscous. The distinctive characteristic is the very small feet, about 6 mm. in length. Only *M. subulatus* has feet as small, and it differs from the present species in its pale colour.

Habitat.—Most variable; has been collected in flight in openings in dense coniferous forests, in parkland, and in clumps of trees around oases in semi-desert areas. Has been found resting in cavities in trees and under loose shingles.

Biology.—A single young one is born in July. The species hibernates along the southern coast and has been taken on the wing during warm periods in the winter.

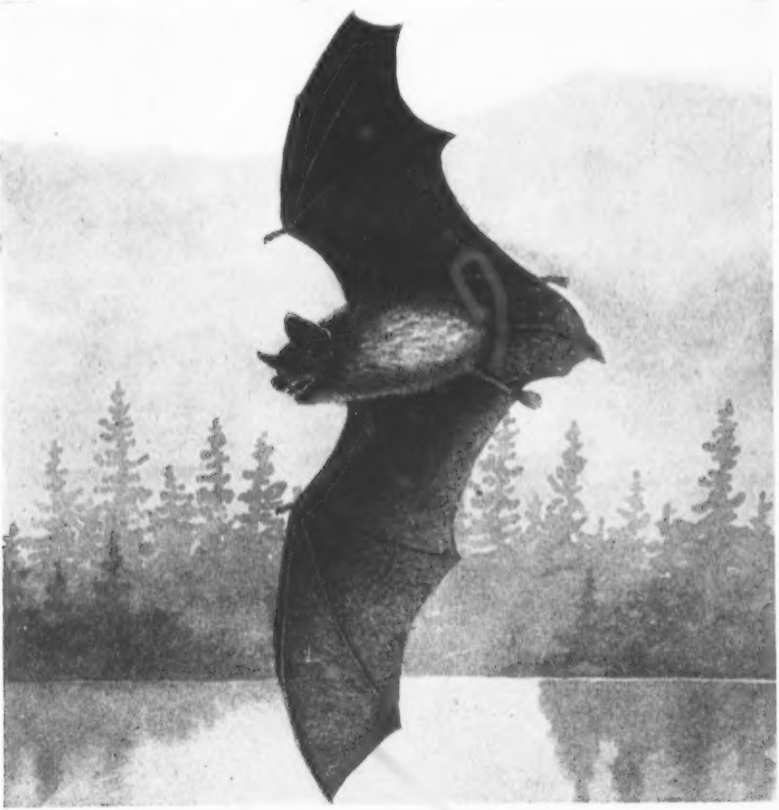
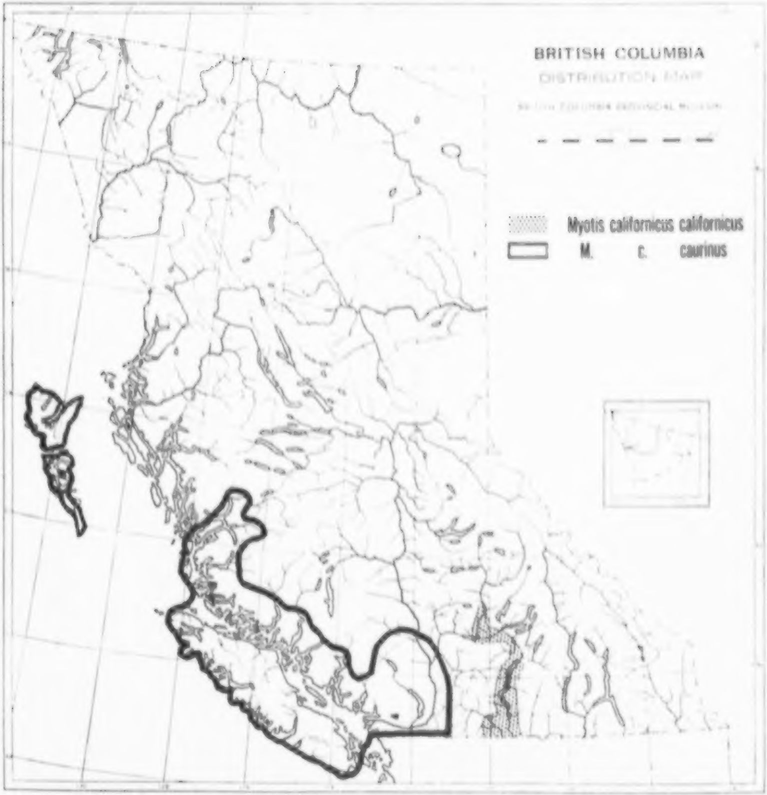


Plate 10. California Myotis, *Myotis californicus.*

Distribution.—Along the entire coast-line of the Province from Vancouver to Prince Rupert, on Vancouver and Queen Charlotte


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Myotis californicus californicus
M. c. caurinus

Map 8. Distribution of the California Myotis, *Myotis californicus*.

Islands, eastward to include the Okanagan and North Thompson valleys.

SUBSPECIES

Myotis californicus californicus (Audubon and Bachman)

Audubon and Bachman, Journ. Acad. Nat. Sci. Phila. *8* (2): 285. Type locality, California.

Distinctions.—Pale, reddish, almost dull cinnamon to hazel in colour, membranes brown.

Measurements.—Four specimens: Total length 83 mm. (81–85); tail 38 mm. (36–39); hind foot 7 mm. (6–7); wing-spread 225 mm.

Distribution.—Known in the Province from the southern Okanagan Valley. Specimen records: Osoyoos Lake, Vaseux Lake, Hemp Creek, Hedley, Keremeos.

Myotis californicus caurinus Miller

Miller, North Amer. Fauna *13*:72, 1897. Type locality, Masset, Graham Island, Queen Charlotte Islands, British Columbia.

Distinctions.—Dark brown to fuscous in colour rather than the hazel brown of *californicus*. Measurements do not differ.

Measurements. — Fourteen specimens: Total length 80 mm. (79–84); tail 36 mm. (30–40); hind foot 6.6 mm. (5.5–7.5); wing-spread 225 mm. (220–229).

Distribution. — The coastal areas inland as far as Lillooet. Specimen records from Langara Island, Masset, Sandspit, Stuie, Rivers Inlet, Kingcome Inlet, Cape Scott, Port Hardy, Bute Inlet, Quinsam, Comox, Parksville, Alberni, Nanaimo, Sahtlam, Seton Lake, Hope, Chilliwack Valley, Bowen Island, Port Moody, Vancouver, Victoria. There is a September specimen, possibly migrant, from Okanagan Landing.

Long-eared Myotis

Myotis evotis (H. Allen)

Description.—The colour of this species varies from a bright golden olive to a duller yellowish-brown. It is distinguishable from all species but the Keen bat and the fringe-tailed bat by its long, blackish ears that, laid forward, extend more than 5 mm. in front of the nose. The other two species named have the ears extending about 4 mm. in front of the nose. The fringe-tailed bat differs in a pronounced rather than scattered fringe of hairs on the tail membrane. Keen bat is most easily distinguishable on size and skull characteristics.

Habitat.—Varies with the two subspecies occurring in the Province. The race *pacificus* is found in the coast forest region where rock outcroppings prevail. The interior race *evotis* is found in variable habitat, described under Distribution in the subspecific treatment.

Biology.—Little is known of the habits of this bat in British Columbia. In other areas it is known to hunt late at night with a direct rather slow flight, similar to that of *keeni.* Of twelve specimens taken at Vermilion Crossing, British Columbia, on July 7th, 1946, all were females, two of which each contained a single fœtus.

SUBSPECIES

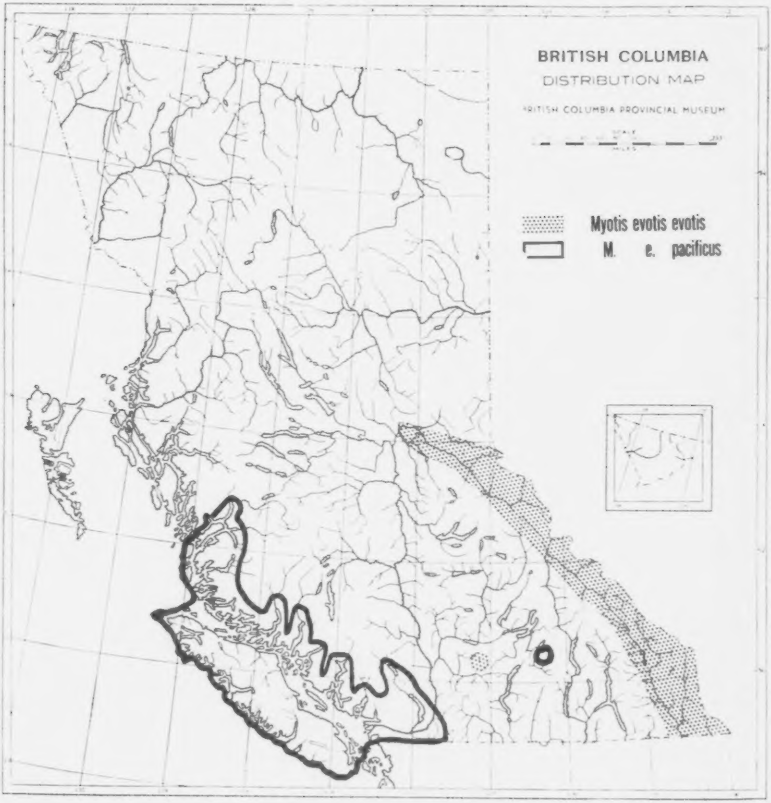
Myotis evotis evotis (Allen)

Allen, Monogr., Bats of North Amer., Smith, Misc. Coll. *165*: 42–43, 1864. Type locality, Monterey, California (Dalquest, Proc. Biol. Soc. Wash. *56*:1–2, 1943).

Distinctions.—Larger and paler than *pacificus* with larger hind foot.

Measurements.—Thirteen specimens measured: Total length 98 mm. (92–103); tail 44 mm. (42–47); hind foot 11 mm. (10–11).

Distribution.—Occurs sporadically through central and southern portions of the Province in variable habitat; found in the Dry Forest and also in the Sub-alpine Forest. Roosting-sites have been in hollow trees and in buildings where small colonies of twelve to thirty individuals have been encountered. Specimen records from Summit Lake (near Prince George), Merritt, Vermilion Crossing, and Cranbrook.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Myotis evotis evotis
M. e. pacificus

Map 9. Distribution of the Long-eared Myotis, *Myotis evotis*.

Myotis evotis pacificus Dalquest

Dalquest, Proc. Biol. Soc. Wash. *56*:2, 1943. Type locality, near Yacolt, Clark County, Washington.

Distinctions. — Distinguished from the previous subspecies by smaller size and darker colour. Extremely difficult to separate from *Myotis keeni.*

Measurements.—Four specimens: Total length 90 mm. (85–96); tail 41 mm. (40–45); hind foot 9 mm. (7–10).

Distribution.—The south-westerly part of the coast forest region north of Kimsquit, usually in forested areas with broken rock outcroppings. Specimens from Kimsquit, Kingcome Inlet, Horseshoe Lake, Powell River, Victoria, Allison Pass (Manning Park), Hope, Sugar Lake.

Keen Myotis

Myotis keeni keeni (Merriam)

Merriam, Amer. Nat. *29*:860, 1895. Type locality, Masset, Graham Island, Queen Charlotte Islands, British Columbia.

Description.—Dorsal colour dull olive to rich glossy brown, wing and ear membranes almost black. Ears long, when laid forward extending about 4 mm. beyond the tip of the nose. Distinguished from *M. evotis* by shorter forearm (35 to 38 mm.) as against 37 to 41 mm. and smaller skull (14.8 to 15 mm.) in greatest length as against 15 to 16.5 mm. in *evotis.*

Measurements.—Four specimens: Total length 82 mm. (78–85); tail 38 mm. (34–40); hind foot 9.5 mm. (9–10).

Habitat.—This bat inhabits the dense timber tracts, where it flies high along the forest aisles and around ponds and other clear areas. The flight is usually direct and rather slow. It is apparently a solitary species, hanging up in tree cavities and crevices in cliff faces.

Distribution.—Coastal regions of the Province from northwestern Washington northwards and on the Queen Charlotte Islands. Specimen records from Telegraph Creek, Masset, Copper Bay, Rose Harbour, Kimsquit River, Stuie, Port Hardy, Parksville.

Little Brown Myotis

Myotis lucifugus (LeConte)

Description.—This is another of the small brown bats all very similar in size. The species is more variable in colour than any other and may be anything from yellowish-brown to dark chocolate brown or almost black. Except in the juvenile, the fur tips are paler than the bases, burnished and glossy. Positive indentification can only be made by using the cleaned skull, on which the long rostrum and evenly sloping dorsal outline is distinctive (Fig. 9 (*a*)). Hind foot 9 to 11 mm.

Habitat.—Found in almost all forested habitats throughout the Province as well as around buildings, clearings, and rocky cliffs. Absent above timber-line.

Biology.—This species frequently gathers in very large colonies in the attics of buildings and similar locations. Such colonies, sometimes several thousand strong, are made up of females and young. The males live a more solitary life. The young number one or two and are born in July. During hot weather this bat has been seen coming to drink at midday. Some hibernating spectimens have been found near Vancouver, but the majority of the population migrates.

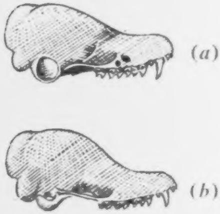


Fig. 9. Side view of skulls of (*a*) *Myotis lucifugus* and (*b*) *Myotis yumanensis* to show higher brain case and " dished in " outline of the latter.

SUBSPECIES

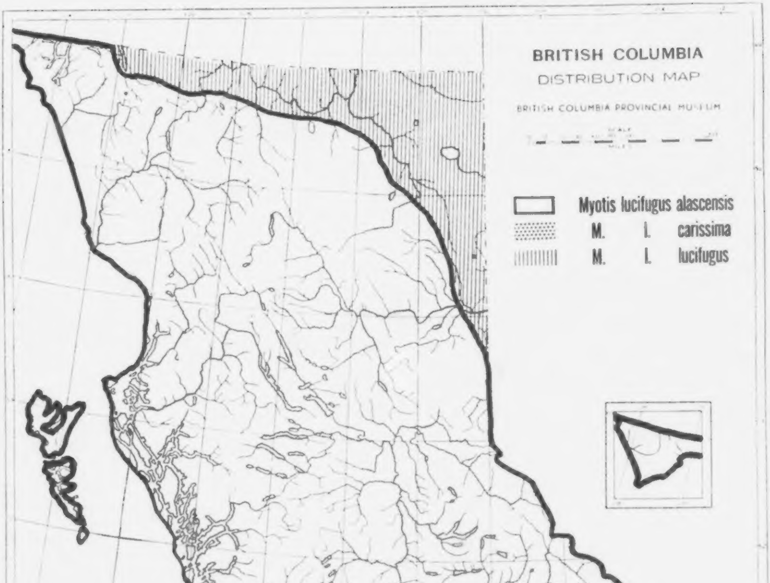
Myotis lucifugus alascensis Miller

Miller, North Amer. Fauna, *13*:63, 1897. Type locality, Sitka, Alaska.

Distinctions.—Dark brown in colour as compared to *lucifugus* and *carissima.*

Measurements—Similar to *lucifugus.*

Distribution. — The Province west of the Rocky Mountains, except for the southern end of the Okanagan Valley and possibly


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Myotis lucifugus alascensis
M. l. carissima
M. l. lucifugus

Map 10. Distribution of the Little Brown Myotis, *Myotis lucifugus*.

adjacent areas to the east. Localities of occurrence are: Screw Creek, 10 miles south and 50 miles east of Teslin, Wistaria, Fort St. James, Tetana Lake, west end of Eutsuk Lake, Indianpoint Lake, Seton Lake, Williams Lake, Canim Lake, Chilko Lake, Lac la Hache, Hemp Creek, Masset, Sandspit, Queen Charlotte City, Copper Bay, Kent Inlet, Murder Cove, Florence Lake, Duncan, Vancouver, Hope, Alta Lake, Assiniboine, Invermere.

Myotis lucifugus carissima Thomas

Thomas, Ann. Mag. Nat. Hist., Series 7, *13*:383, 1904. Type locality, Lake Hotel, Yellowstone Park, Wyoming.

Distinctions.—The average colour is brighter and paler than in the other subspecies.

Measurements.—Similar to *lucifugus.*

Distribution. — Specimens identified as this subspecies have been taken at Cache Creek, Okanagan Landing (an area of intergradation), Vernon, Vaseux Lake, and Osoyoos. Populations of this bat in the Okanagan Valley are not quite typical but are closer to this subspecies than any other; occasional specimens with the colouration of this race occur outside the indicated range; one such in a large series of *alascensis* from Alta Lake is noteworthy.

Myotis lucifugus lucifugus (LeConte)

LeConte, in McMurtrie, The Animal Kingdom . . ., by Cuvier, *1*:431. Type locality, Georgia.

Distinctions.—Differs in paler brown colour than *alascensis;* duller than *carissima.*

Measurements.—Twenty-one specimens: Total length 87 mm. (81–91); tail 37 mm. (31–41); hind foot 9.4 mm. (9–11).

Distribution.—Occurs in the Peace River area of the extreme north-eastern and in the south-eastern parts of the Province. Recorded from Atlin, Charlie Lake, and from north-eastern end of Muncho Lake, Akamina Pass.

Small-footed Myotis

Myotis subulatus melanorhinus (Merriam)

Merriam, North Amer. Fauna *3*:46, 1911. Type locality, Little Spring, north base of San Francisco Mountain, Coconino County, Arizona.

Description.—Very small size, small foot (6 mm. or less), and pale coloration identify this species. It closely resembles *M.c. californicus* but differs in more orange or yellowish colour and in having the face almost black. Critical separation can be based upon skull structure. This species has an abruptly elevated brain case, while *californicus* has a more obtuse angle between rostrum and brain case.

Measurements.—Five specimens: Total length 79 mm. (72–84); tail 34 mm. (32–36); hind foot 7 mm.

Habitat.—Specimens were taken in open stands of black poplar adjacent to lake-shores. The species flew low and erractically and was taken in a hand-net.

Biology. — Nothing is known about local details of its life-history.

Distribution.—Known only from Vaseux Lake, Oyama, and Osoyoos Lake, in the most arid part of the Okanagan Valley.

Fringed Myotis

Myotis thysanodes thysanodes Miller

Miller, North Amer. Fauna *13*:80, 1897. Type locality, Old Fort Tejon, Kern County, California.

Description.—Pale sandy brown in colour with brown ears and wing membranes. This is a medium-sized pale-coloured bat with large ears extending, when laid forward, about 5 mm. beyond the end of the nose. It has a conspicuous fringe of pale brown hairs on the free margin of the tail membranes, most noticeable in the half inch on each side of the tail.

Measurements.—Two specimens: Total length 89 mm. (86–93); tail 38.5 mm. (36–41); hind foot 10.5 mm. (10–11).

Habitat.—Presumably the dry yellow-pine type of forest.

Biology.—The specimens taken came from the attic of an occupied house. Elsewhere it has been found in similar localities sometimes associated with large colonies of other species.

Distribution.—Known only from Vernon, at the head of the Okanagan Valley, but to be expected elsewhere in the arid region.

Long-legged Myotis

Myotis volans longicrus (True)

True, Science *8*:588, 1886. Type locality, Puget Sound, Washington.

Description.—This is the largest of the so-called " little brown bats." It differs from the others in slightly larger size, longer forearm, and in having a well-marked keel on the calcar close to the foot (*see* Fig. 7 (*c*)). Its colour is a uniform dark chocolate brown to fuscous and is thus among the darkest of the small bats.

Measurements.—Seven specimens: Total length, 95 mm. (88–99); tail 46 mm. (38–54); hind foot 9 mm. (8–10); wing-spread 260 mm. (255–270).

Habitat.—Specimens have been taken as they flew in forested glades among the spruces of the Sub-alpine Forest.

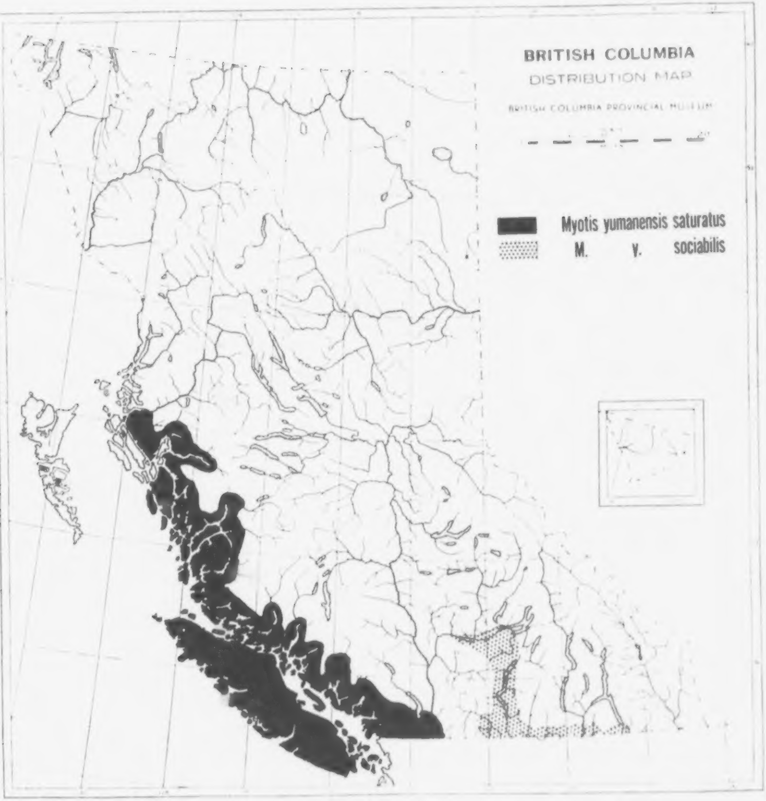
Biology.—Nothing is known.

Distribution.—This is a rare bat in the Province, but from the scattered records it can be inferred that it is widely distributed. Specimens from Atlin, Mount Revelstoke, Hazelton, Kispiox, Lac la Hache, Huntingdon, Cranbrook, Vancouver.

Yuma Myotis

Myotis yumanensis (Miller)

Description.—A small brown bat with large hind feet, distinguishable only with difficulty from *M. lucifugus.* The colour of the two subspecies differs markedly and will be described there. One characteristic of this species is the lustreless hair tips and almost woolly hair texture; this helps separate it from all except young *lucifugus.* Critical identification depends upon the skull. *M. yumanensis* has an up-tilted rostrum and abruptly elevated brain case, while *lucifugus* has the dorsal outline but slightly concave (Fig. 9 (*b*)). Hind foot 9 to 11 mm.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Myotis yumanensis saturatus
M. y. sociabilis

Map 11. Distribution of the Yuma Myotis, *Myotis yumanensis*.

Habitat.—The southern half of the Province, usually in the more open spaces than in the timber—around clearings, lakes, waterways, and roads.

Biology.—Sometimes forms large colonies in attics or walls of houses. Migrates, except possibly on the extreme southern coast. Little else is known of the habits of this species in British Columbia.

SUBSPECIES

Myotis yumanensis saturatus Miller

Miller, North Amer. Fauna *13*:68, 1897. Type locality, Hamilton, Skagit County, Washington.

Distinctions.—Distinguished by its rich chestnut to fuscous fur colour, black ears and wing membranes. Fur tips of back without lustre.

Measurements. — Eighteen specimens (nine of each subspecies): Total length 86 mm. (77–91); tail 37 mm. (34–42); hind foot 9.5 mm. (9–11); wing-spread 240 mm. (225–245).

Distribution.—This subspecies is known from Vancouver, Skagit, Port Moody, Bowen Island, Cultus Lake, Hope–Princeton Road, Shuswap, Florence Lake, Cowichan Lake, Duncan, Port Hardy, Sahtlam, Goose Island, Princess Royal Island, Hagensborg, Eucott Hotsprings, Kimsquit, Kingcome Inlet, King Island, Port John, Loughborough Inlet, Bute Inlet, Stillwater, Brackendale, Rivers Inlet.

Myotis yumanensis sociabilis Grinnell

H. W. Grinnell, Univ. Calif. Publ. Zool. *12*:318, 1914. Type locality, Old Fort Tejon, Kern County, California.

Distinctions.—Easily recognized by its pale, dull, almost greyish-brown kinky or woolly fur without lustre.

Measurements.—As listed in preceding subspecies.

Distribution.—It is known from the southern arid region. Specimen records from Kamloops, Lehman, Okanagan Landing, Vaseux Lake, Sicamous, Westbridge, Creston.

FAMILY MOLOSSIDÆ—FREE-TAILED BATS

GENUS TADARIDA—FREE-TAILED BATS

Big Free-tailed Bat

Tadarida molossa (Pallas)

Pallas, Miscellanea zoologica, p. 49; Spicelegia zoologica, fasc., p. 8, 1767. Type locality, America, possibly Surinam.

Distinctions.—A large bat with large, low, broad ears almost meeting across the forehead, tail extends for one-third or more of its length behind the interfemoral membrane (Fig. 7 (*a*)). The fur is very short and of fine velvet-like texture, reddish-brown in colour.

Measurements.—Total length 139 mm.; tail 52 mm.; hind foot 13 mm.

Distribution.—One record for the Province and for Canada. A specimen from New Westminster, November, 1938.

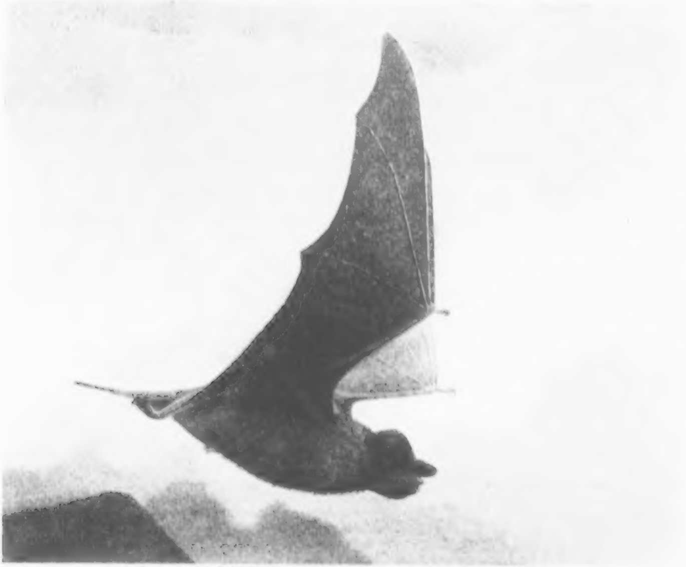


Plate 11. Big Free-tailed Bat, *Tadarida molossa.*

KEY TO THE SPECIES OF RABBITS, HARES, AND PIKAS (ORDER LAGOMORPHA)

1. Form rabbit-like, ears long, hind feet more than twice as long as front. Leporidæ. Hares and rabbits.

2. Length of ear, notch to tip, greater than 3 inches. Colour white in winter. Townsend jackrabbit. *Lepus townsendi.*

2′. Length of ear, notch to tip less than 3 inches.

3. Hind foot less than 4 inches, bright chestnut patch on nape. Brown in winter.

4. Dorsal colour greyish, washed with black, abdomen white. Mountain cottontail. *Sylvilagus nuttalli.*

4′. Dorsal colour brownish flecked with black, abdomen with buff suffusion. Eastern cottontail. *Sylvilagus floridanus.*

3′. Hind foot more than 4 inches. No chestnut patch on nape. White in winter except in Puget Sound Lowlands. Snowshoe hare. *Lepus americanus.*

1′. Form not rabbit-like, hind feet not twice as long as fore, ears rounded. Habitat in rock-slides or talus slopes only. Ochotonidæ.

5. Range north of Skeena, Parsnip, Peace River drainages. Collared pika. *Ochotona collaris.*

5′. Range south of Skeena, Parsnip, Peace River drainages. Rocky Mountain pika. *Ochotona princeps.*

ORDER LAGOMORPHA—PIKAS, HARES, AND RABBITS

FAMILY OCHOTONIDÆ—PIKAS OR ROCK RABBITS

GENUS OCHOTONA—PIKA

Description.—Pikas are somewhat less than guinea-pig size, short-legged, have no external tail, and almost circular, quite prominent external ears. The soles of the feet are furred, except for the small black plantar pads. In colour they vary from almost black through various shades of brown to pale greyish-brown. There are two pairs of upper incisors—a large anterior pair, which are grooved, and a very small peg-like pair behind them. (Fig 10).

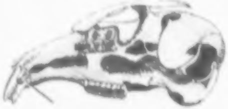


Fig. 10. View of skull of rock rabbit from lower side to show two pairs of incisors.

Habitat.—Pikas occupy broken rock and talus where this is adjacent to sources of suitable food. They range from sea-level along some of the coastal fiords to as high as mammal life is possible, at 9,000 feet or so in the Rocky Mountains.

Biology.—They are versatile feeders, eating most of the plants of their habitat. We have taken as many as fifty species of alpine plants from the food store of one of these animals. They do not hibernate, but remain active during the winter, living upon lichens and upon the dried plants stored for the purpose during the summer. The hay piles, carefully stored beneath large dry stones, are characteristic. Young number from two to six and are born in May to June. Females are nursing in July and August at the same time as independent young are about, thus a second litter is indicated in at least some individuals.

Call notes consist of a shrill nasal bleat and a chattered series of barks.

In *O. princeps* there are two annual moults—one taking place gradually between late June and early September, the other in late

Plate 12. Rocky Mountain Pika, *Ochotona princeps*.

September and October. The winter and summer pelages differ in colour in all races. *O. collaris* is reputed to have but one annual moult, between July and September.

Collared Pika

Ochotona collaris (Nelson)

Nelson, Proc. Biol. Soc. Wash. *8*:117, 1893. Type locality, near head of Tanana River, about 200 miles south of Fort Yukon, Alaska.

Description.—Upper parts drab on the back, becoming grey on the sides, faintly washed with pinkish-buff. An indistinct collar of pale grey on the neck and shoulders. Ears blackish, edged with pale buff, usually with a large whitish or pale-brown patch on the inner surface. Underparts whitish. Spring specimens appear nearly grey all over the back and sides. The skull is like that of *princeps* but broader, with the interpterygoid fossa broader and somewhat spatulate. Nasals shorter, bullæ longer.

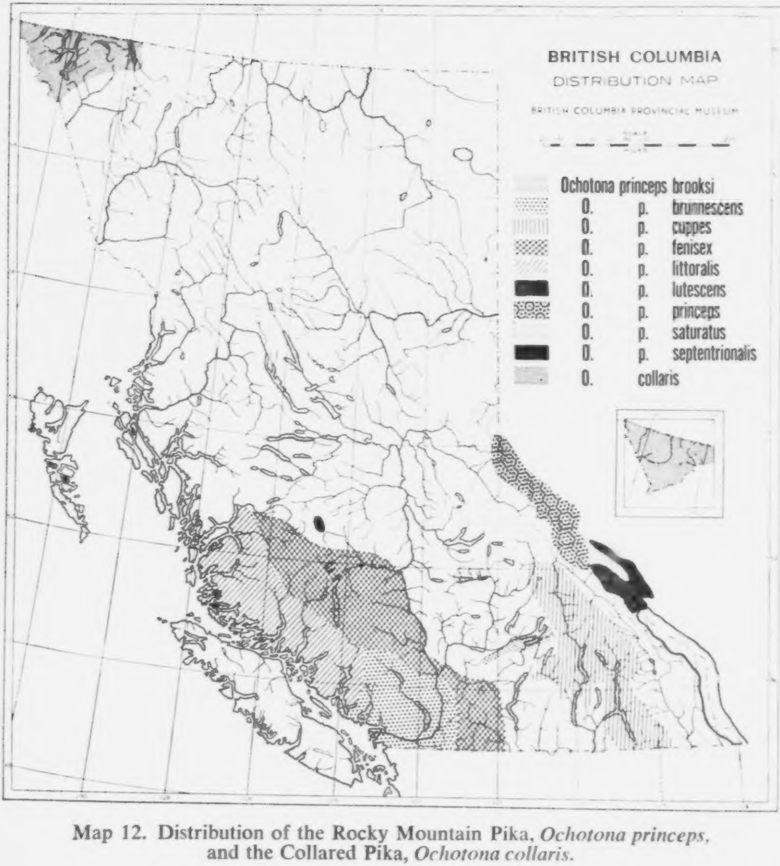
Measurements.—Fifteen adults from Alaska (Howell, 1924) measured: Total length 189 mm. (178–198); hind foot 30 mm. (29–31).

Distribution.—Extreme northern British Columbia; specimens from Kelsall Lake, Stonehouse Creek, south end of Tagish Lake, Teslin Lake, Atlin Lake, Bennett City. One of the largest areas from which the genus is unknown lies north of Peace River and east of Teslin Lake.

Rocky Mountain Pika

Ochotona princeps (Richardson)

Description.—Very like *collaris*, from which it differs only in colour and in certain minor cranial features. Colour in summer and winter pelage generally brownish and without the grey collar of *collaris*. Some races, however, are almost if not quite as pale and greyish as is the northern species. Skull with narrow interorbital construction, long nasals, and parallel-sided pterygoid fossa. For a review of the subspecies in British Columbia *see* Cowan, 1955.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Ochotona princeps brooksi
O. p. brunnescens
O. p. cuppes
O. p. fenisex
O. p. littoralis
O. p. lutescens
O. p. princeps
O. p. saturatus
O. p. septentrionalis
O. collaris

Map 12. Distribution of the Rocky Mountain Pika, *Ochotona princeps*, and the Collared Pika, *Ochotona collaris*.

SUBSPECIES

Ochotona princeps brooksi Howell

Howell, North Amer. Fauna *47*:30, 1924. Type locality, Sicamous, British Columbia.

Distinctions. — Separated from *fenisex, brunnescens,* and *cuppes,* the adjacent races, by colour characters that are difficult to describe, though readily appreciable with the animals in hand. This subspecies has the body colour brown with a yellowish hue; patches of pale yellowish-brown lie on each side of the neck. Underparts soiled whitish, often with cinnamon hair-tips. Cranial features offer important differences between many of the subspecies.

Measurements.—Eight adult topotypes: Total length 204 mm. (193–213); hind foot 31.7 mm. (30–32).

Distribution.—The south central part of the Province; specimens from Sicamous, Tappen, Shuswap, Robbins Range (20 miles south-east of Kamloops).

Ochotona princeps brunnescens Howell

Howell, Proc. Biol, Soc. Wash. *32*:108, 1919. Type locality, Keechelus, Kittitas County, Washington.

Distinctions.—One of the darkest races in the species. Colour in winter mixed cinnamon and black, giving a rich brown hue, darkest on the head and rump, underparts paler, cinnamon. Summer pelage more reddish; head, sides of neck, and shoulders predominantly reddish-brown. An occasional specimen occurs in a blackish-brown colour phase. Larger than *fenisex.*

Measurements.—Fourteen adult males: Total length 210 mm. (200–228); hind foot 33 mm. (31–35).

Distribution.—The west slope of the Cascade and Coast Ranges north at least to Alta Lake and south into Washington. Specimens from Hope, Chilliwack, Mount Baker Range, Sumas, Tamihi Creek, North Vancouver, Alta Lake and vicinity.

Ochotona princeps cuppes Bangs

Bangs, Proc. New England Zool. Club *1*:40, 1899. Type locality, Monashee Pass, east of Vernon, British Columbia.

Distinctions.—Paler than *brooksi,* darker than *princeps,* winter pelage with a heavy intermixture of black hairs among the buff or clay colour of the dorsal surface. Summer pelage with underparts heavily washed with pinkish-cinnamon, and pronounced patches of the same colour on the lower sides of the neck. The bright cinnamon features of the pelage become intensified in the south-eastern Selkirks near Invermere, and blending with *princeps* is strongly suggested by the greyer, dull-coloured animals of the Mount Revelstoke area.

Measurements. — Twenty-four specimens: Total length 191 mm. (175–204); hind foot 32 mm. (30–36).

Distribution.—Inhabits the Monashee and Selkirk Ranges and the outlying mountains associated with these groups. Specimens from Monashee Pass, Mount Revelstoke, Glacier, Toad Mountain near Nelson, Rossland, Paradise Mine (19 miles west of Invermere), Phoenix.

Ochotona princeps fenisex Osgood

Osgood, Proc. Biol. Soc. Wash. *26*:80, 1913. Type locality, near head of Ashnola River, British Columbia. First described as *Lagomys minimus* by Lord, Proc. Zool. Soc. London 1863:96.

Distinctions.—Slightly smaller in size than the adjoining races and differing from *brunnescens,* particularly in paler more greyish colour. Underparts and hind feet nearly white.

Measurements.—Average of thirty-one adults of both sexes: Total length 200 mm. (186–211); hind foot 34 mm. (31–36).

Distribution.—The eastern slope of the Cascade Range north through the western part of the Chilcotin plateau at least to the Dean River, spreading to the coast at the heads of some of the longest inlets. Specimens from Kimsquit, Cariboo Mountains south of Stuie, Rainbow Mountains, Stuie, Kleena Kleene, Redstone, Hanceville (24 miles west of Williams Lake), Blackwater River, MacGillivray Creek (Lillooet), Texas Creek, Stirling Creek, Hedley, Tulameen, Ashnola River, mountains west of Okanagan Lake.

Ochotona princeps littoralis Cowan

Cowan, Murrelet *35*:22–23, 1955. Type locality, Hagensborg, British Columbia.

Distinctions.—The same size as *brunnescens* but much darker, with much black in the pelage. Underparts buff, but hairs banded with black to give a sooty-brown colour. No light spot behind the ears.

Measurements.—Means and extremes of twelve adult males: Total length 208.5 mm. (193–216); hind foot 33.7 mm. (32–35).

Distribution.—The coastal slope of the Coast Range Mountains from the Bella Coola Valley south to Bute Inlet, possibly further as the specimens from Black Mountain, North Vancouver, approach the race. Specimens examined from Hagensborg, head of Rivers Inlet, Bute Inlet, Fawn Bluff, Purcell Point, Arran Rapids.

Ochotona princeps princeps (Richardson)

Richardson, Zool. Journ. *3*:520, 1828. Type locality, probably near head of Athabasca River, Alberta.

Distinctions.—Except for *lutescens,* the greyest of all the *princeps* species in Canada. In the winter, pelage consists of yellowish or clay-coloured hairs and black-tipped hairs. Underparts white. Summer pelage darker. Skull with long narrow nasals and narrow interpterygoid fossa.

Measurements.—Twenty-eight adults from the region of Jasper, Alberta, measured: Total length 191 mm. (181–204); hind foot 30.5 mm. (29–37).

Distribution. — Not well understood. Specimens from near Cranbrook and Spillimacheen cited by Howell (1924) are not *princeps* but *cuppes.* Known to inhabit the Rocky Mountains from Mount Robson and Yellowhead Pass south apparently into Montana. However, the range appears to be fragmented by the presence of populations of small, pallid animals indistinguishable from *lutescens.* Specimens have been identified from Yellowhead Pass, Mount Robson, Thompson Pass, Mount Stephens at Field, Assiniboine, Tornado Pass, Mount Howe (Akamina Pass), Mount Evans near Cranbrook, Morrissey.

Ochotona princeps saturatus Cowan

Cowan, Murrelet *35*:23, 1955. Type locality, Mount Huntley, Wells Gray Park, British Columbia.

Distinctions.—Like *brunnescens* in general darkness of colour but with less brown and more dark grey in the general tone. Much darker than the adjacent races—*princeps* to the east and *brooksi* to the south.

Measurements. — Means and extremes of six adults: Total length 184.5 mm. (175–204); hind foot 32 mm. (31–34).

Distribution.—Known only from the mountains of Wells Gray Park, but probably occurs in the mountains west of the North Thompson River and south and east of the Fraser River. Specimens examined from Mount Huntley and Murtle Lake in Wells Gray Park. Specimens from Indianpoint Lake are intermediate between *saturatus* and *princeps*, the resulting colour being close to that of *cuppes.* For purposes of classification, however, we are including them in the present subspecies.

Ochotona princeps septentrionalis Cowan and Racey

Cowan and Racey, Canad. Field-Nat. *60*:102, 1946. Type locality, Itcha Mountains, British Columbia.

Distinctions.—The palest of the races of the western part of the Province. Smaller in external size and in most of the cranial dimensions than the adjacent subspecies *brunnescens* and *brooksi* (*see* Cowan and Racey, 1946, for details).

Measurements.—Only two specimens from type locality available. Total length 184 mm.; hind foot 32.8 mm.

Distribution.—Known only from the type locality.

FAMILY LEPORIDÆ—HARES AND RABBITS

GENUS LEPUS—HARES

White-tailed Jackrabbit

Lepus townsendi townsendi Bachman

Bachman, Journ. Acad. Nat. Sci. Phila. *8* (1):90, 1839. Type locality, near Wallula, Walla Walla County, Washington.

Description.—Large size; upper parts in summer pale grey tinged with black and brown; tail pure white. In winter entire pelage white. Hind legs and ears long. Greatest length of skull over 90 mm.

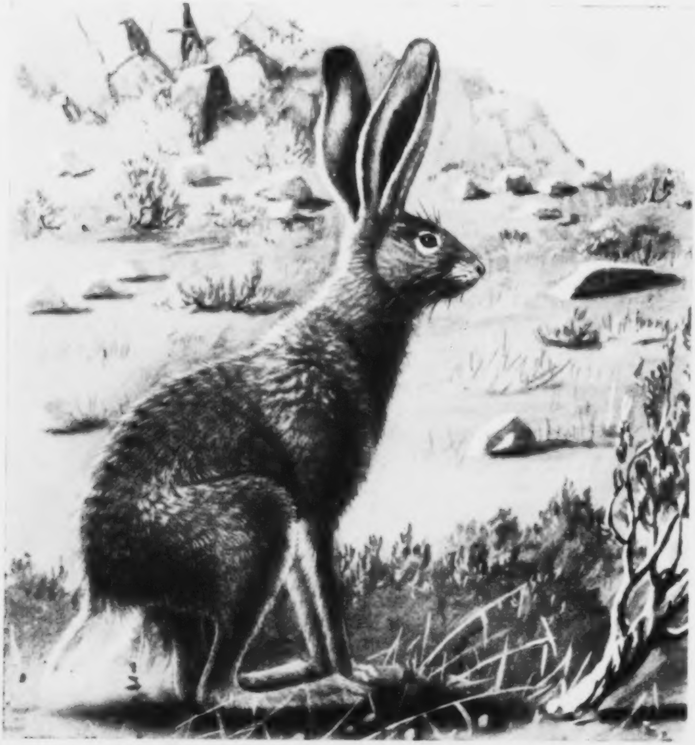


Plate 13. White-tailed Jackrabbit, *Lepus townsendi*.

Measurements.—Four adults from Osoyoos measured: Total length 582 mm. (561–602); tail 82 mm. (75–86); hind foot 152 mm. (150–154); ear from notch (dry) 102 mm. (96–106).

Weight from 6½ to 10½ pounds. Yearlings are smaller: 510, 84, 144 are representative measurements, and weight 4½ pounds.

Habitat.—This is an inhabitant of the sagebrush plains from the valley-bottoms to an elevation of 2,000 feet.

Biology.—Litter size and gestation period are unknown. A female shot May 24th contained six fœtuses 2 inches in length.

Distribution.—The Okanagan Valley from Osoyoos to White Lake. Formerly abundant but cultivation has reduced its numbers. Specimens from Osoyoos, Oliver, White Lake, Okanagan Falls.

Snowshoe Hare or Varying Hare

Lepus americanus Erxleben

Description.—Of typical hare form, with disproportionately long legs. The body colour in summer pelage is some shade of rich brown, the ears usually black on the tip and outer edge; the underparts white. The large hind feet develop a sole pad of long, stiff, densely packed hair that is especially well developed in the winter. At this time each hind foot, with toes spread in soft snow, may have an area of 14 square inches. The tail is dark above, white below, but is carried in the depressed position with the upper surface showing. A white winter pelage is the rule, and this is gradually acquired by moult at the season of the year that snowfall is usually encountered. Change is earlier at high elevations than at low. Even in the white pelage the under-fur is usually pinkish, brown, or grey. The ear-tips and eyelids remain black. The subspecies inhabiting the humid south-west coast strip has a brown winter pelage. Feet in summer white or brown, varying with the subspecies. The young of all species have the feet brown in summer. For a detailed treatment of subspecific differences *see* Dalquest (1942).

Habitat.—This hare prefers a semi-open type forest in which openings such as clearings, lake-shores, muskegs, and riparian thickets provide deciduous vegetation while dense clumps of conifers give shelter from inclement weather and from predators. Within this forest structure the species of tree dominant seems to be relatively unimportant. Snowshoe hares are equally at home in the lodgepole pine stands of the interior and Rocky Mountains, the spruce forests of the mountain slopes, the cedar and alder thickets of the south coast, and the timber-line parkland of procumbent balsams.

Biology.—The snowshoe hare does not burrow; its resting-place consists of a small depression or "form" situated in a thicket, beneath the lower branches of a small tree or shrub, within the roots of a stump, or in similar partially sheltered locations. The young number from two to four in a litter and there may be four litters per year. The gestation period is thirty-six days. The young are born fully furred and with eyes open. They begin feeding on green food almost immediately.

Plate 14. Snowshoe Hare or Varying Hare, *Lepus americanus*.

These hares are subject to periodic great increases in abundance that recur at intervals of from six to fourteen years, the mean period being 9.7 years. Their occurrence varies from place to place and is most regular and most spectacular in the north. In the south-western part of the Province the population remains comparatively stable. The cause of the increase and decline has been the subject of many researches, but the final answer is still unknown.

Snowshoe hares are preyed upon by almost all the carnivorous mammals and as well by larger hawks and owls, and thus constitute a food source of the greatest importance to the fur-bearing mammals. They were and still are to a certain extent an important item in the diet of the native peoples. They are important also as reservoirs of some animal diseases communicable to man, such as Rocky Mountain spotted fever and tularæmia, and as hosts of the tick that transmits the first of these. In some areas the hares have damaged young forest plantations and orchards, but in general they do not constitute an economic problem.

SUBSPECIES

Lepus americanus bairdi Hayden

Hayden, Amer. Nat. *3*:115, 1869. Type locality, near Fremont Peak, Wind River Mountains, Wyoming.

Distinctions.—Very like *columbiensis,* with dark body and contrastingly paler head, black tail and rump patch. Somewhat more richly coloured than that race. Differs in having fore and hind feet white in summer pelage.

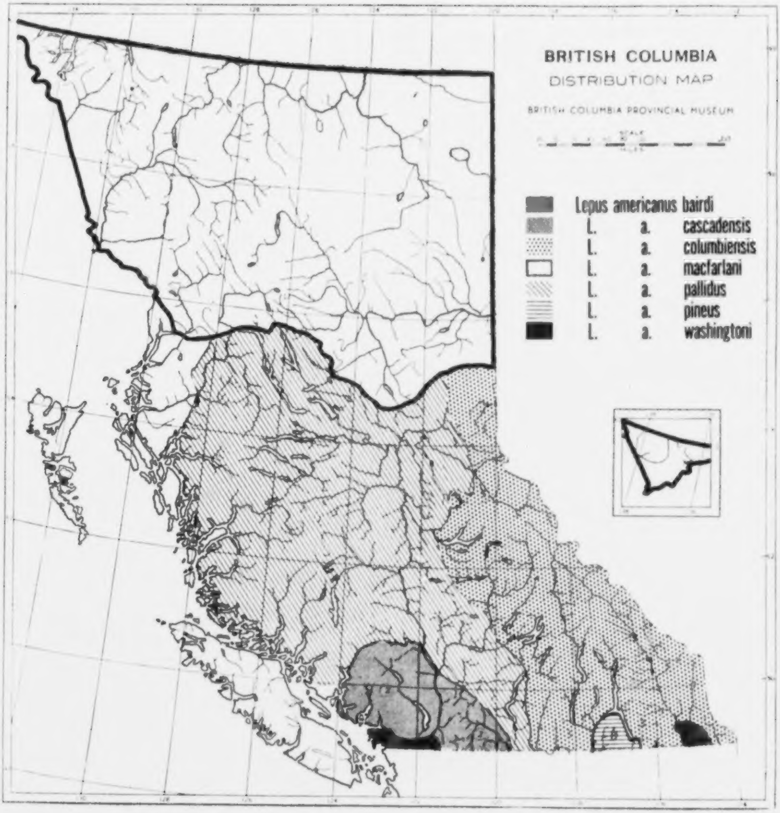
Measurements.—Four specimens: Length 457 mm.; tail 40.5 mm.; hind foot 144 mm.; ear from notch measured dry 70 mm.

Distribution.—Enters the Province only in the extreme southeastern corner. Specimens are known from Elko, Newgate, and St. Mary Lake.

Lepus americanus cascadensis Nelson

Nelson, Proc. Biol. Soc. Wash. *20*:87, 1907. Type locality, 13 miles east of Hope, British Columbia.

Distinctions.—A brightly coloured snowshoe hare, paler and brighter than any of the other races. Upper parts near orange cinnamon with dark hair-tips giving a generally darker hue; as in *columbiensis,* head distinctly paler than body; less black on tail and rump than in that race; tail to mid-part black, rest white. Underfur pale cinnamon buff, grey at base; hind feet brown in summer.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Lepus americanus bairdi
L. a. cascadensis
L. a. columbiensis
L. a. macfarlani
L. a. pallidus
L. a. pineus
L. a. washingtoni

Map 13. Distribution of the Varying Hare, *Lepus americanus*.

Winter pelage usually white; one specimen from Alta Lake has the winter pelage steel grey.

Measurements.—Means and extremes of ten specimens: Total length 428 mm. (402–468); tail 43 mm. (41–47); hind feet 138 mm. (135–143). Weight 2¾ pounds (2¼ to 3¼), five individuals.

Distribution.—The Cascade Mountains from Jervis Inlet south into the State of Washington. Specimens from Sechelt Inlet, Alta Lake, Hope, North Vancouver, Whytecliffe, Brackendale, Chilliwack Lake, Skagit, Fairview–Keremeos summit, Ashnola River. Similkameen Valley, Lillooet.

Remarks.—Nelson (1909) confused this subspecies with *pallidus* and with *columbiensis,* and cites specimens from localities now know to be inhabited only by those races. As a result, his characterization was at fault in many details.

Lepus americanus columbiensis Rhoads

Rhoads, Proc. Acad. Nat. Sci. Phila., *47*:242, 1895. Type locality, Vernon, British Columbia.

Distinctions. — Easily distinguished in summer pelage from *pallidus,* the adjoining race to the west, by its richer brown body colour, about cinnamon brown with black hair-tips, whitish rather than grey underfur, head markedly paler and more reddish than the body; upper surface of tail and adjacent rump area black; hind feet white in summer pelage. Not distinguishable on external features in white winter pelage. Colour pattern like that of *cascadensis* but darker throughout.

Measurements.—Means and extremes of twenty-three adults of both sexes: Total length 431 mm. (390–466); tail 49 mm. (48–54); hind foot 140 mm. (131–145).

Distribution.—Eastward from the Okanagan Valley to include the western slope of the Rockies. North from the International Boundary to the Barkerville region, where it intergrades with *pallidus.* Specimens from Indianpoint Lake, Bridesville summit, Vernon (intergrades with *pallidus*), Inkaneep Creek, Vaseux Lake, Monashee Pass, Mount Revelstoke, Sicamous, Rossland, Radium Hot Springs.

Lepus americanus macfarlani Merriam

Merriam, Proc. Wash. Acad. Sci. *2*:30, 1900. Type locality, Fort Anderson, near mouth of Anderson River, Northwest Territories.

Distinctions.—The darkest and greyest race of the species but very variable in colour. In general it lacks the warm brown tones of all other western races. Upper parts dusky brownish-grey, but some individuals are quite brownish, with a varying amount of black, particularly on the mid-dorsal region and rump. The latter may be almost black. Head similar but with a dark yellowish-buff suffusion on the sides. Fore and hind feet and lower legs white; tail black; underfur dull yellowish-brown, grey basally; underparts white. Larger than any of the other subspecies. Skull differs mostly in larger size and relatively larger bullæ.

Measurements.—Means of six adults: Total length 488 mm.; tail 42 mm.; hind foot 149 mm.; ear from notch 69 mm.

Distribution.—The northern half of the Province. Specimens from Stonehouse Creek near junction with Kelsall River, Atlin, Fort Halkett (14 miles north), Tupper Creek, Lower Liard Crossing, Glenora on the Stikine River, Tetana Lake.

Lepus americanus pallidus Cowan

Cowan, Journ. Mammal. *19*:242, 1938. Type locality, Chezacut Lake, British Columbia.

Distinctions.—Colour much like *americanus* but with longer feet and ears and a smaller skull with larger auditory bullæ. Differs from *macfarlani* in smaller size, smaller hind feet and ears, paler and browner coloration, sides of face and lower neck brown rather than grey, much less black on back. From *columbiensis* and *cascadensis* it differs in many respects, greyish rather than white underfur, absence of black above the base of the tail, and the dull rusty yellowish head only slightly differentiated from the general body colour, rather than the head pinkish-cinnamon and contrasting with the rest of the body colour.

Measurements.—Average of seven adults of both sexes: Total length 452 mm. (437–473); tail 38 mm. (35–41); hind foot 138 mm. (130–144); ear (dry) 67 mm. (63–72). Six specimens from the Bella Coola Valley are smaller and average 425 mm., 44 mm., and 129 mm. respectively.

Distribution.—Generally distributed in the Cariboo Parklands and along the valley of the Thompson and South Thompson Rivers east to Sicamous. Specimen records from Wistaria, Ootsa Lake, Vanderhoof, Nukko Lake, Puntchesakut Lake, Chezacut Lake, Chilco Lake, Indianpoint Lake, Lac la Hache, Wentworth Lake, Sicamous, 83 Mile on the Cariboo Highway, Quesnel, McQueen Lake, Falkland, Hagensborg, Kimsquit, Stuie.

Lepus americanus pineus Dalquest

Dalquest, Journ. Mammal. *23*:178, 1942. Type locality, Cedar Mountain (Moscow Mountain), Latah County, Idaho.

Distinctions.—Darker in colour than *columbiensis* and with dark-coloured head more sharply delimited from the paler-coloured body; smaller than *columbiensis* in all respects except interorbital width, which is relatively and actually greater. From *cascadensis* distinguished in paler, less coppery coloration; shorter body length, wider cranium, and other skull differences.

Measurements.—Three specimens average: Total length 467 mm. (455–485); tail 54 mm. (48–61); hind foot 148 mm. (138–155).

Distribution. — The only specimens with the characteristics ascribed to this race are one from Trail and one from near Creston; two others from south of Creston show intergradation with *columbiensis.*

Lepus americanus washingtoni Baird

Baird, Proc. Acad. Nat. Sci. Phila. 7:333, 1855. Type locality, Steilacoom, Pierce County, Washington.

Distinctions.—Darkest of the snowshoe hares. Upper parts rich chestnut brown, or sayal brown liberally blended with black hair-tips, paler on lower sides, white beneath. Winter pelage brown but paler than that of summer. Upper side of fore and hind feet brown in all pelages, soles of hind feet blackish, undersides of toes dirty white. Underside of tail slightly greyish-brown. The smallest of the western showshoe hares, with proportionately small ears and hind feet.

Measurements.—Means and extremes of ten adults: Total length 432 mm. (427–450); tail 37 mm. (30–45); hind foot 124 mm. (120–135); ear from notch (dry) 65 mm. (61–68). Weight of each of four adults, 2¼ pounds.

Distribution.—Confined to the Fraser River delta south of the Fraser River and the lower slopes of the adjacent mountains. Does not occur north of Burrard Inlet. Specimens from Point Grey, Vancouver, Lulu Island, Aldergrove, Huntingdon, Douglas, Chilliwack, Cultus Lake.

Genus SYLVILAGUS—Cottontails

Mountain Cottontail

Sylvilagus nuttalli nuttalli (Bachman)

Bachman, Journ. Acad. Nat. Sci. Phila. 7:345, 1837. Type locality, near Vale, Malheur River Valley, Malheur County, Oregon.

Distinctions.—The smallest of our rabbits; general colour pale brownish-grey, with black hair-tips, sides and rump grey; underside white; forelegs and outside of hind legs buff; hind feet almost white above. Patch of bright buff on nape of neck and upper shoulders. Upper side of tail same as body, but tail carried so as to expose the white underside. Ears short, white inside, grey with black tip outside. Winter colour much like summer.

Measurements.—Five adults from Idaho (Davis, 1939) and three from British Columbia average: Length 349 mm. (340–350); tail 44 mm. (44–45); hind foot 89 mm. (86–90); ears 56 mm. (54–60).

Habitat.—The cottontail is an inhabitant of the thickets in gullies along stream-sides, lake-shores, and meadows of the southern dry belt.

Biology.—The nest is constructed in a burrow; there are two young per litter, and there may be two or three litters a year. First litters are apparently born in late April and are quickly followed by a second litter. Gestation period, twenty-eight to thirty days.

Distribution.—Confined to the Okanagan and Similkameen Valleys from Osoyoos to Penticton and from Nighthawk to Keremeos. Specimens seen from Osoyoos, Anarchist Mountain, Oliver, White Lake Valley, and living animals seen at Keremeos.

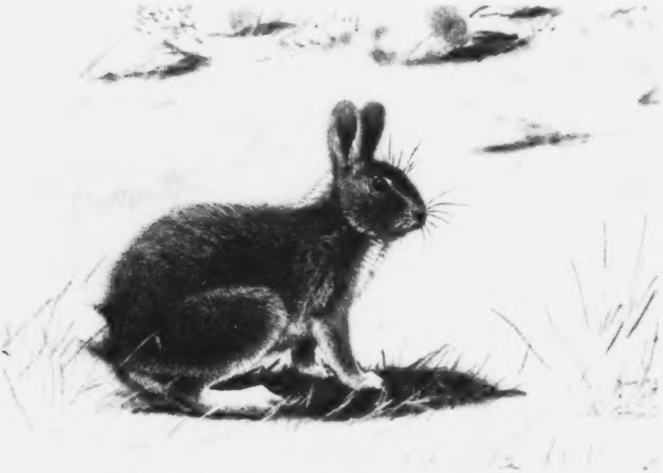


Plate 15. Mountain Cottontail, *Sylvilagus nuttalli.*

Eastern Cottontail

Sylvilagus floridanus mearnsi (Allen)

Allen, Bull. Amer. Mus. Nat. Hist. *6*:171, 1894. Type locality, Fort Snelling, Minnesota.

Distinctions.—Closely like the mountain cottontail, from which it differs in browner coloration, the back being fawn in general tone flecked with black, sides pale cinnamon, the same colour extending on to the sides of the abdomen and sometimes over the entire abdomen; insides of ears whitish with a well-marked margin of cinnamon; nape, cinnamon; fore and hind legs shading from cinnamon to rufous, differing in intensity with the individual.

Measurements.—One adult female measured: Total length 428 mm.; tail 64 mm.; hind foot 88 mm.; ear from notch 51 mm. Weight 2 pounds 5 ounces.

Habitat.—The weed-grown roadsides and field borders.

Biology.—Nothing is known of the life-history of this species in British Columbia. It is a recent arrival from introduced populations in the State of Washington. First specimens were taken in British Columbia in 1952.

Distribution.—The Fraser River delta from Langley Prairie to Huntingdon. Specimens from both localities.

KEY TO THE SPECIES OF RODENTS (ORDER RODENTIA)

1. Tail bushy, at least a third as long as body, underside of tail not white, no abdominal scent glands, no infraorbital foramen, strongly developed post-orbital processes (Fig. 11 (*a*)). Squirrel-like rodents. Sciuridæ.

2. Loose fold of skin, or gliding membrane, on each side from wrist to hind leg. Flying squirrel. *Glaucomys sabrinus.*

2′. No gliding membrane along sides.

3. With dorsal or lateral longitudinal stripes.

4. Four light stripes on back. Chipmunks. *Eutamias.*

5. Colour generally dull brown, total length, adults, 9⅝ inches or larger. Townsend chipmunk. *Eutamias townsendi.*

5′. Colour generally greyish-brown, red brown on sides, total length less than 9⅝ inches. *Eutamias minimus, amœnus,* and *ruficaudus.*

4′. Two light stripes on back.

6. Four prominent black stripes on sides and back. Mantled groundsquirrel. *Citellus lateralis.*

6′. Two median dark stripes obscure, almost absent. Cascade mantled groundsquirrel. *Citellus saturatus.*

3′. No dorsal striping.

7. Size large (15¾ inches or more), body stout, dorsal colour without trace of spotting. Marmots. *Marmota* sp.

8. Range confined to Vancouver Island, colour uniform dark brown. Vancouver Island marmot. *Marmota vancouverensis.*

8′. Range on mainland.

9. Underparts yellow or chestnut.

10. Underparts chestnut, longest front claws 7/16 inch or more. Woodchuck. *Marmota monax.*

10′. Underparts yellow, longest front claw less than 7/16 inch. Yellow-bellied marmot. *Marmota flaviventris.*

9′. Underparts not yellow or chestnut but greyish. Hoary marmot. *Marmota caligata.*

7′. Size smaller (less than 15¾ inches total length).

11. Dorsal surface spotted, nose as far as eyes orange-brown. Columbian groundsquirrel. *Citellus columbianus.*

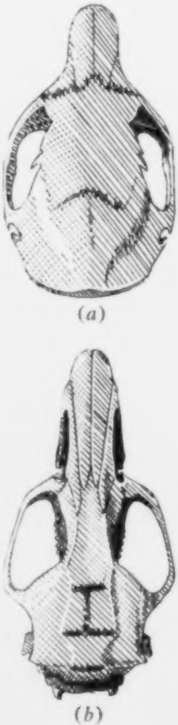


Fig. 11. Dorsal view of skulls of (*a*) squirrel and (*b*) bushy-tailed wood rat.

11′. Dorsal surface brown to olive-brown, not spotted, nose to eyes not orange-brown.

12. Underparts white or grey. Red squirrel. *Tamiasciurus hudsonicus.*

12′. Underparts orange, yellowish, or yellowish-brown. Douglas squirrel. *Tamiasciurus douglasi.*

1′. Tail not bushy or, if bushy, underside white, abdominal scent glands present or absent, infraorbital foramen present or absent, postorbital processes weak or absent (Fig. 11 *(b)*).

13. Tail bushy, underside white. Wood rat, pack rat. *Neotoma cinerea.*

13′. Tail not bushy.

14. Tail and body covered with quills. Porcupine. *Erethizon dorsatum.*

14′. Tail and body without quills, tail either with scales or clothed in fur or fine hairs.

15. Tail dorsoventrally flattened, paddle-shaped, scaly. Beaver. *Castor canadensis.*

15′. Tail not dorsoventrally flattened and scaly.

16. Tail somewhat flattened laterally, scaly, hind feet webbed. Muskrat. *Ondatra zibethica.*

16′. Tail cylindrical, hind feet with or without web.

17. Hind feet webbed. Nutria. *Myocastor coypus.*

17′. Hind feet not webbed.

18. Body length more than 11 inches, and tail very short (about 1 inch). Tail completely covered with brown fur. Mountain beaver. *Aplodontia rufa.*

18′. Body length less than 11 inches, tail long or short.

19. About rat size, a fur-lined cheek pouch on each side of mouth, ears short. Northern pocket gopher. *Thomomys talpoides.*

19′. No fur-lined cheek pouch on each side of mouth.

20. Upper incisors grooved longitudinally (Fig. 12).

21. Hind foot more than 1 inch. Jumping mouse. *Zapus.*

22. Upper tooth row less than 3.6 mm., tail usually less than 5½ inches, hind foot usually $1\frac{3}{16}$ inches or less. Meadow jumping mouse. *Zapus hudsonius.*

22′. Upper tooth row more than 3.8 mm., tail usually more than 5⅛ inches, hind foot more than $1\frac{3}{16}$ inches.

23. Sides brilliant yellow-buff, usually small buff patches on chest, ears obscurely edged with pale buff. Northwestern jumping mouse. *Zapus trinotatus.*

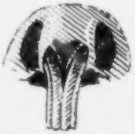


Fig. 12. Upper incisors of jumping mouse to show longitudinal grooves.

23′. Sides dull yellow-buff to grey-buff or olivaceous, underparts usually without buff areas, ears edged with white. Western jumping mouse. *Zapus princeps.*

21′. Hind foot less than 1 inch.

24. Tail approximately equal to hind foot in length, much shorter than body. Lemming vole. *Synaptomys.*

24′. Tail about as long as body. Harvest mouse. *Reithrodontomys.*

20′. Upper incisors not grooved longitudinally.

25. Tail length more than 5⅞ inches. Old world rats. *Rattus.*

26. Tail longer than body. Roof rat. *Rattus rattus.*

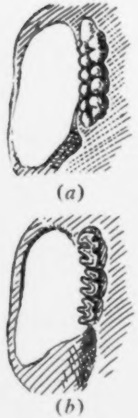
26′. Tail shorter than body. Norway rat. *Rattus norvegicus.*

25′. Tail length less than 5⅞ inches.

27. Yellowish-grey underparts; tail about as long as body. House mouse. *Mus musculus.*

27′. Underparts grey or whitish; tail much less than body.

28. Ears prominent, hairless, upper sides of feet white; tail almost equal to or exceeding body length; cheek teeth tuberculate (Fig. 13 (*a*)).


(*a*)

(*b*)

Fig. 13. Cheek teeth of a (*a*) white-footed mouse to show tuberculate condition and (*b*) bushy-tailed wood rat to show columnar structure.

29. Prominent external cheek pouches, lined with furred skin. Great Basin pocket mouse. *Perognathus parvus.*

29′. No external cheek pouches. White-footed mouse. *Peromyscus maniculatus.*

28′. Ears small, usually haired, tail shorter than body, cheek teeth not tuberculate but in columns (Fig. 13 (*b*)).

30. Colour of back either including at least some yellowish-tawny or reddish-brown areas.

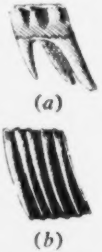
31. Colour entirely yellowish-tawny, tail about as long as hind foot, cheek teeth without roots. Brown lemming. *Lemmus trimucronatus.*

31′. Reddish-brown area along mid-back, tail half as long as body, cheek teeth with roots.

32. Tail yellow beneath and densely furred. Tundra redback vole. *Clethrionomys rutilus.*

32′. Tail whitish or grey beneath and sparsely furred. Boreal redback vole. *Clethrionomys gapperi.*

30′. No reddish-brown or tawny on back.


(*a*)

(*b*)

Fig. 14. Cheek teeth of (*a*) heather-vole and (*b*) field vole to show difference in rooted and not rooted condition.

33. Cheek teeth with roots (Fig. 14 (*a*)); colour greyish-brown, fur soft and lax, feet whitish. Mountain heather-vole. *Phenacomys intermedius.*

33′. Cheek teeth without roots (Fig. 14 (*b*)); colour dull brown or dull grey-brown.

34. Tail longer than $2\frac{1}{16}$ inches.

35. Hind foot about 1 inch long. Richardson vole. *Microtus richardsoni.*

35′. Hind foot less than ⅞ inch long.

36. Tail of adult less than 2¾ inches, colour dark brown, range confined to Puget Sound Lowlands, and Vancouver Island region. Townsend vole. *Microtus townsendi.*

36′. Tail of adult more than 2¾ inches, colour dark greyish-brown. Range not confined to above region. Long-tailed vole. *Microtus longicaudus.*

34′. Tail shorter than 2$\frac{1}{16}$ inches.

37. Colour greyish-brown, range confined to the arid south central area. Mountain vole. *Microtus montanus.*

37′. Colour brown or yellowish-brown.

38. Underparts buffy yellowish. Tundra vole. *Microtus operarius.*

38′. Underparts grey or whitish.

39. Fur short and woolly, and of even dark brown, eyes small. Creeping vole. *Microtus oregoni.*

39′. Fur longer, soft and of a grizzled brown colour, eyes larger. Meadow vole. *Microtus pennsylvanicus.*

ORDER RODENTIA—RODENTS

FAMILY APLONDONTIDÆ—MOUNTAIN BEAVERS

GENUS APLODONTIA—MOUNTAIN BEAVERS

Mountain Beaver

Aplodontia rufa (Rafinesque)

Description.—Of the general size of a muskrat (12 inches) but distinguished by having almost no tail; head broad and flat with small eyes and ears and long whiskers. Forefeet with strong claws. Colour generally dark brown with underparts greyer.

Habitat.—The species lives in the humid forests of the southwest coast where there is an abundance of ground vegetation. Near cultivation it can be a nuisance. Range extends to timberline.

Biology.—The mountain beaver constructs long, complicated burrows, 6 to 8 inches in diameter, opening to the surface here and there. It comes to the surface usually at night, when it forages close to the burrow entrance and drags food back under cover. Food consists of a wide variety of plants, ferns, tree-leaves, in fact almost every plant in its vicinity. The animal can climb trees but does so infrequently. The young number two to four and are born in April. Gestation period is unknown.

SUBSPECIES

Aplodontia rufa rufa (Rafinesque)

Rafinesque, Amer. Monthly Mag. 2:45, 1817. Type locality, western slope of Mount Hood, Clakamas County, Oregon.

Distinctions.—Smaller, with a smaller skull than the next race.

Measurements.—Nine adult males from Huntingdon and vicinity measured: Total length 357 mm. (336–378); tail 33 mm. (31–36); hind foot 59 mm. (55–65). Four females: Total length 350 mm. (350–358); tail 25 mm. (22–32); hind foot 58 mm. (56–60).

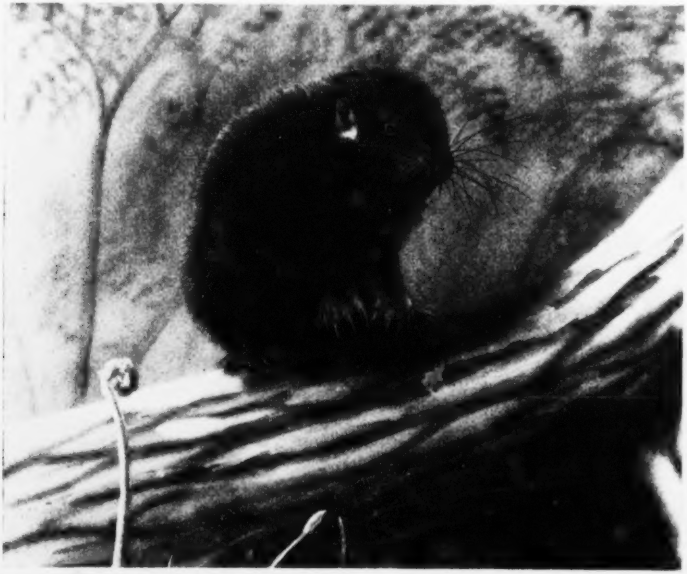


Plate 16. Mountain Beaver, *Aplodontia rufa.*

Distribution.—The Puget Sound Lowland area south of the Fraser River from Hope westward to Aldergrove. Specimens from Huntingdon, Aldergrove, Vedder Crossing, Lihumitson.

Aplodontia rufa rainieri Merriam

Merriam, Proc. Biol. Soc. Wash. *13*:21, 1899. Type locality, Paradise Creek, Mount Rainier, Pierce County, Washington.

Distinctions.—A weakly characterized race, larger than the *rufa*.

Measurements.—Three adult males from Manning Park measured: Total length 374 mm. (362–390); tail 35 mm.; hind foot 58 mm. (53–60). Two adult females: Total length 361 mm. (353–370); tail 44 mm. (35–52); hind foot 62 mm. (61–64).

Distribution.—Known from the higher forested areas of the Cascade Mountains. Specimens from Mile 14 on the Hope–Princeton Highway, Allison Pass, and from the Nicola Valley near Merritt.

FAMILY SCIURIDÆ — SQUIRRELS, CHIPMUNKS, AND MARMOTS

GENUS MARMOTA—MARMOTS

Marmot or Woodchuck

Marmota monax (Linnæus)

Description.—As in all marmots, this species is stout-bodied and with a relatively short, bushy tail. The upper parts are rich cinnamon to almost chestnut with many white-tipped hairs; underparts reddish-brown, about chestnut in shade. Tail blackish to cinnamon or light buff in different subspecies. Sides of neck the same colour as back, forelegs overlaid with deep reddish-coloured hair. Upper part of head dark brown with no white markings except occasionally around the nose. The dark underparts, absence of light patches on sides of neck, and absence of white markings on the face distinguish this species from the yellow-bellied marmot. Black individuals are quite common.

Habitat.—Usually in open parkland forest or on the edges of fields, but found also in alpine rock-slides. Very quiet and unobtrusive.

Biology.—Feeds on a wide variety of herbaceous plants and grasses. Lives in burrows excavated under the base of a tree, under a stone, or among tumbled rocks. One litter of young is born each year in May after a gestation of thirty-five to forty days. Young numbered from one to seven in cases examined.

SUBSPECIES

Marmota monax canadensis (Erxleben)

Erxleben, System. Regni Anim. *1*:363, 1777. Type locality, Quebec, Province of Quebec.

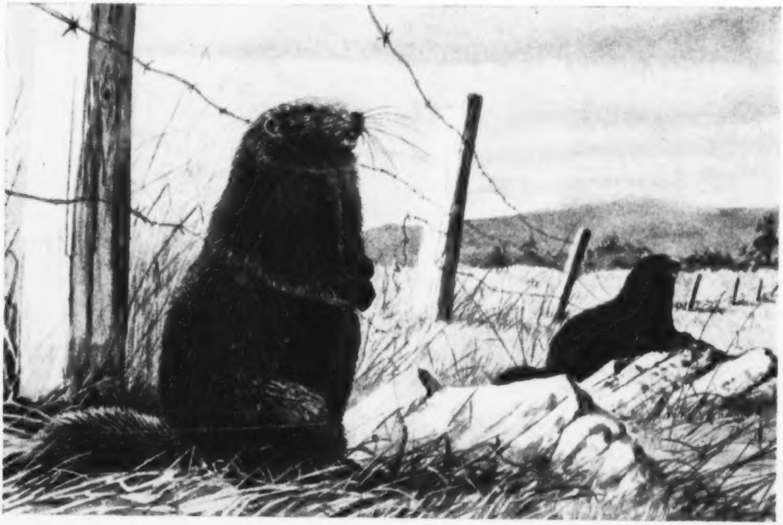
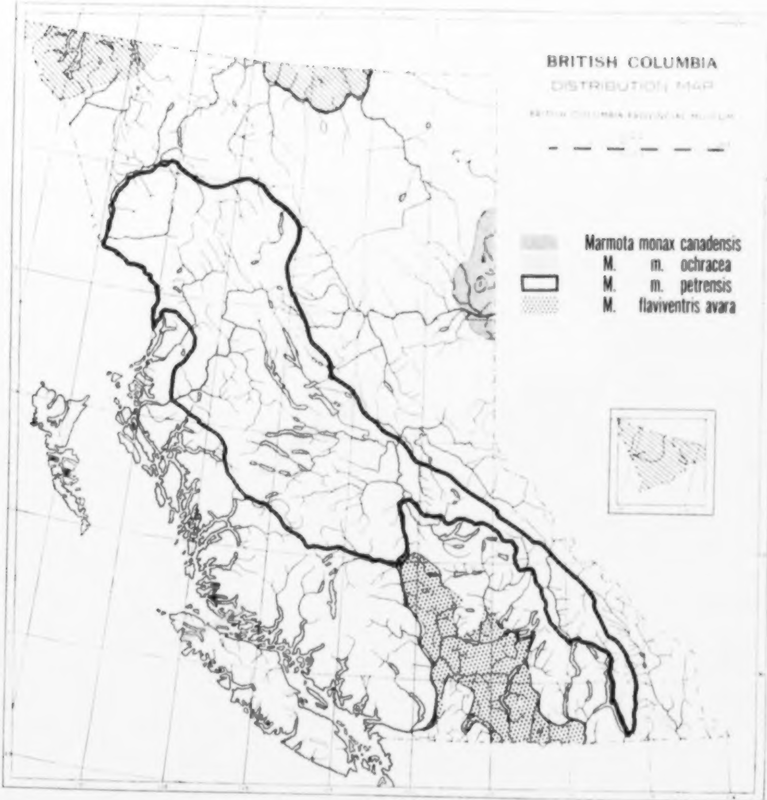


Plate 17. Marmot or Woodchuck, *Marmota monax*.

Distinctions. — Colour paler and more rust-brown than in *petrensis*. Skull smaller.

Measurements.—Seven adults of both sexes had the following measurements: Total length 514 mm. (475–550); tail 135 mm. (129–150); hind foot 75 mm. (72–80).

Distribution.—Known from the Peace River District, where specimens were taken at Tupper Creek and Charlie Lake.


BRITISH COLUMBIA
DISTRIBUTION MAP
Marmota monax canadensis
M. m. ochracea
M. m. petrensis
M. flaviventris avara

Map 14. Distribution of the Woodchuck, *Marmota monax,* and of the Yellow-bellied Marmot, *Marmota flaviventris.*

Marmota monax ochracea Swarth

Swarth, Univ. Calif. Publ. Zool. *7*:203, 1911. Type locality, Forty-mile Creek, Alaska.

Distinction.—Paler dorsally than *canadensis* or *petrensis*, the general colour pale yellowish-buff.

Measurements.—No adult specimens of animals with complete measurements have been seen.

Distribution.—The only undoubted specimens of this race seen have been from Atlin and Teslin Lake. Recorded also from Lower Liard Crossing and near junction of Liard and Trout Rivers.

Marmota monax petrensis Howell

Howell, North Amer. Fauna *37*:33, 1915. Type locality, Revelstoke, British Columbia.

Distinctions.—Darker in colour than *ochracea*, but somewhat paler and with a larger skull than *canadensis*. Tail colour paler than in that race, but some specimens are indistinguishable in colour.

Measurements. — Eight specimens of both sexes measured: Total length 523 mm. (460–596); tail 116 mm. (93–130); hind foot 73 mm. (68–77).

Distribution.—Central and south-eastern districts from the Stikine River south to the Chilcotin River and through the mountains east of the Fraser River to Revelstoke and Creston. Specimens examined from Driftwood River, Salvus, Kispiox, Hazelton, Wistaria, Vanderhoof, Tiltzarone Lake, Quesnel, Barkerville, Bowron Lake, Nazko, Lonesome Lake, Revelstoke, Glacier, Creston. Two specimens from Lonesome Lake resemble *ochracea* in colour, and further collecting may reveal this race along the coast mountains from Atlin south to Bella Coola.

Yellow-bellied Marmot

Marmota flaviventris avara (Bangs)

Bangs, Proc. New Engl. Zool. Club *1*:68, 1899. Type locality, Okanagan, British Columbia.

Description.—Size as in the woodchuck or larger; colour of back chestnut brown heavily grizzled with pale buff; head and face dark brown, white mark on face in front of eyes, sides of neck yellow or buff; this, the white mark on the nose, and the shorter front claws will distinguish the yellow-bellied marmot from the woodchuck. Underparts yellowish buff; feet and tail brown.

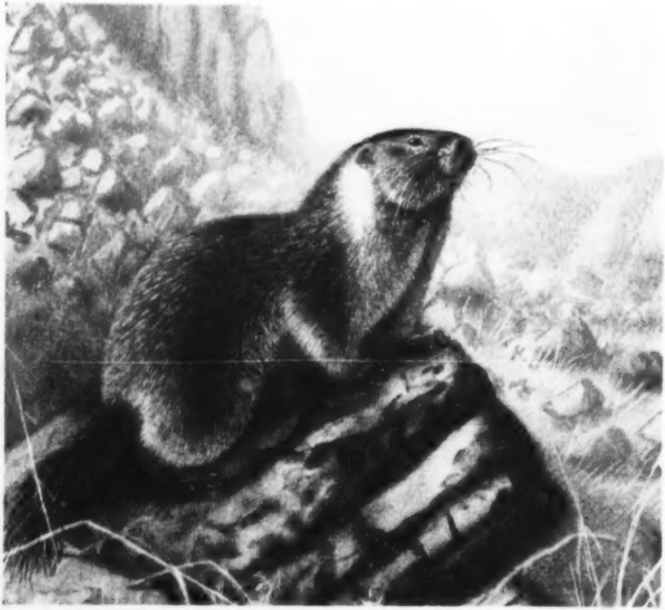


Plate 18. Yellow-bellied Marmot, *Marmota flaviventris.*

Measurements.—Five adult males: Total length 546 mm. (495–660); tail 159 mm. (133–178); hind foot 78 mm. (76–80).

Habitat.—This marmot inhabits the hotter, more arid parts of the Province, where it is most abundant in regions providing an abundance of broken rock, low cliffs, or stone-piles. Along the edge of the grasslands it invades the forest edge where suitable rocky den-sites occur.

Biology. — Feeds on plant material of great variety. Can damage alfalfa and clover crops along field margins. Hibernates between August and April. The young number from three to eight, usuall four or five, and are born in early May. They appear out of the burrow as early as May 24th. This species is one of the favoured hosts of the tick *Dermacentor andersoni,* the transmitter of Rocky Mountain spotted fever and the cause of tick paralysis in man and domestic animals.

Distribution.—The southern parts of the Province from Hope, Lytton, and Sheep Creek in the west, eastward to include the southern Cariboo, the Okanagan Valley throughout its length, the Nicola Valley, and east to Cascade and Trail. Specimens examined from Hope, Boston Bar, Spuzzum, Lytton, Ashcroft, Kamloops, Pass Lake, Black Pines, Heffley Creek, Bonaparte, 70 Mile House, Williams Lake, Sheep Creek Bridge on Fraser River, Manning Park, Nicola, Sicamous, Vernon, Cascade, Midway, Rossland, Trail.

Hoary Marmot or Whistler

Marmota caligata (Eschscholtz)

Description.—The hoary marmot is the largest of the American marmots, with large adults weighing as much as 30 pounds. It is distinctively coloured. The upper parts are grey with a black or brown wash. The shoulders are usually paler than the hind parts and may be almost white; underparts grey; feet and face black, with white markings. Tail dark brown or black in fresh pelage, paler when bleached by exposure. Many of the subspecies are most variable in colour and resemble each other closely. The best distinguishing features are in the skull.

Habitat.—This is a marmot of the alpine meadows and the rock-slides above them. It often descends into the upper edge of timber where suitable rock-slides and open meadows of alpine vegetation are available and occasionally wanders to even lower altitudes.

Biology.—The whistler has only a short period of activity, from April to September at the longest. It hibernates for seven or eight months each year. Mating takes place in April or May, and young are born about a month later. Litters of four to five seem to be most frequent, but there is little information. It probably does not breed until at least 2 years of age. Food consists of a great variety of herbaceous plants. The burrows it makes penetrate deeply and have not been excavated. Its usual call is a shrill prolonged whistle, very like a loud human whistle.

SUBSPECIES

Marmota caligata caligata (Eschscholtz)

Eschscholtz, Zool. Atlas (Pt. 2):1, 1829. Type locality near Bristol Bay, Alaska.

Distinctions. — Pale in colour, foreparts almost white, with small amount of black tipping; hind parts cinnamon buff. Top of head and face black but white patch before eyes very large and often extending over entire face.

Measurements. — Howell (1915) gives adult male: Length 710–715 mm.; tail 210–218 mm.; hind foot 91–105 mm. Adult female: 695, 190, and 95 mm. respectively.

Distribution. — Extreme north-western part of the Province from Atlin, Bennett, Cheonnee Mountains, and south as far as Flood Glacier on the Stikine River.

Marmota caligata cascadensis Howell

Howell, Proc. Biol. Soc. Wash. 27:17, 1914. Type locality, Mount Rainier, Pierce County, Washington.

Distinctions.—Darker than *caligata* or *nivaria,* paler than *oxytona;* mantle pale grey, with a yellowish tinge, lower back varying from yellowish-brown flecked with black to black showing yellowish-brown underfur. Black of forehead extending to between the ears; small black oval patch behind ear but not extending as a line down the neck. Tail yellowish with tips of guard hairs chocolate brown or black; white patch on nose just reaching eyes. Size large, one of the largest of the group.

Measurements.—Four adult males from Alta Lake measured: Total length 732 mm. (702–755); tail 230 mm. (176–235); hind foot 97 mm. (94–100). Adult females (Howell): 714 mm. (680–765); 219 mm. (195–247); 99 mm. (94–107).

Distribution.—The Cascade and Coast Ranges from the International Boundary north into the mountains of the southern Cariboo District west of the Fraser River. Selected localities are Lihumitson Mountains (near Chilliwack), Hope, Alta Lake, Mount McLean (near Lillooet), Spences Bridge, Three Brothers Mountain (in Manning Park).

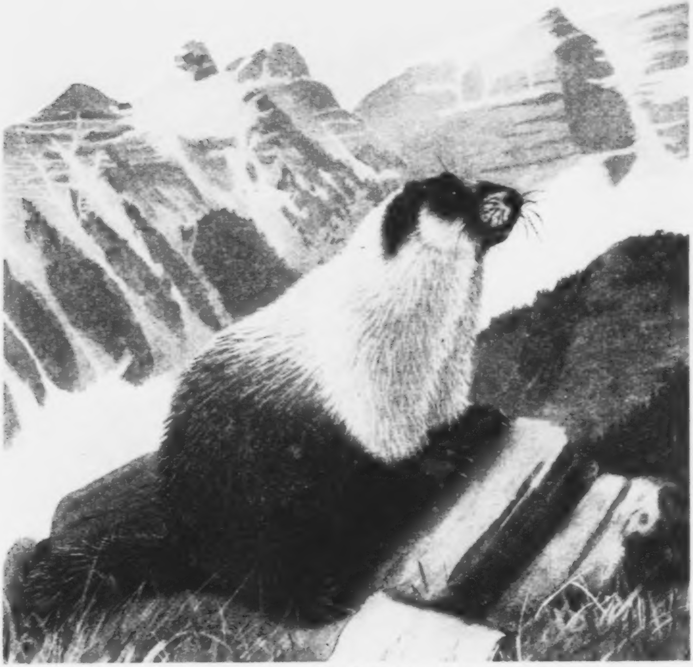
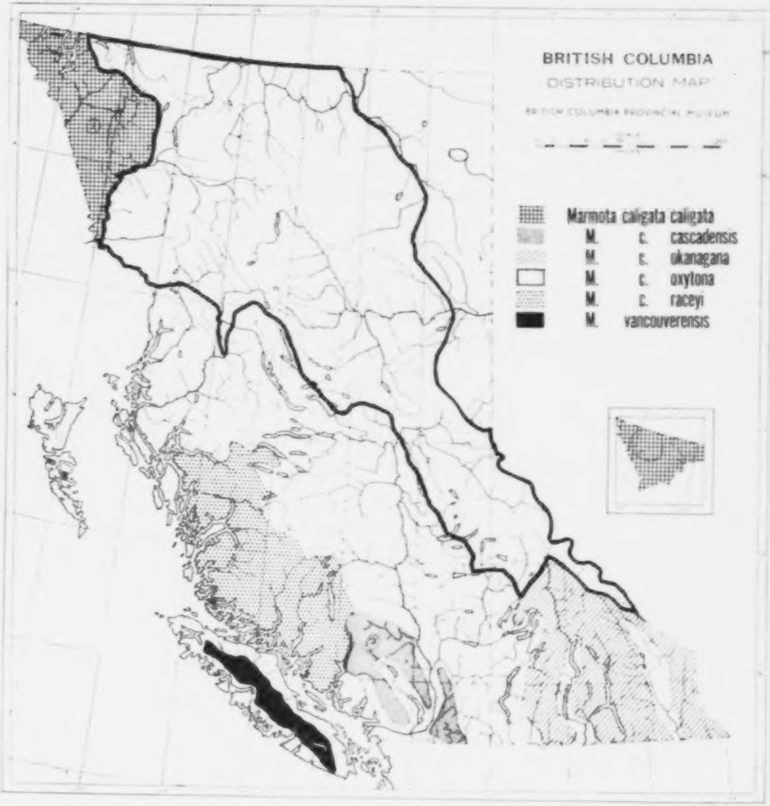


Plate 19. Hoary Marmot or Whistler, *Marmota caligata.*


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Marmota caligata caligata
M. c. cascadensis
M. c. okanagana
M. c. oxytona
M. c. raceyi
M. vancouverensis

Map 15. Distribution of the Hoary Marmot, *Marmota caligata*, and of the Vancouver Marmot, *Marmota vancouverensis*.

Marmota caligata okanagana (King)

King, Narr. Journ. Shores Arctic Ocean *2*:236, 1836. Type locality, Gold Range, British Columbia.

Distinctions. — Forepart of back and sides whitish, strongly sprinkled with black but variable, and some individuals almost white; hind parts cinnamon buff heavily overlaid with black; underparts pale brown. Forehead, dark patch confined between eyes and ears, white on nose often extensive and extending as white guard hairs over the dark crown. A black line down each side of neck from ears to shoulders is distinctive.

Measurements.—Adult males: Total length 694 mm. (670–754); tail 212 mm. (202–218); hind foot 98 mm. (91–106). Adult females: 695 mm. (659–735); 212 mm. (202–224); 94 mm. (93–103) respectively.

Distribution.—South central and south-eastern mountain ranges in the Rocky Mountains, Selkirk, Monashee, and Gold Ranges. Specimens have been seen from Glacier, Spillimacheen, Mount Evans, Toad Mountain near Nelson, Paradise Mine on Toby Creek, Mount Revelstoke, and from Healy Creek and Carthew Lakes (Alberta). Crowe (1943) refers to *nivaria* specimens from near Mount Assiniboine regarded by us as nearer *okanagana*.

Marmota caligata oxytona Hollister

Hollister, Smithsonian Misc. Coll., *56*:1, 1912. Type locality, head of Moose Pass branch of Smoky River, Alberta.

Distinctions.—The darkest of the *caligata* subspecies on the mainland. Upper parts in fresh pelage usually steel grey or darker with much dark brown and black overlying the buff underfur of the hind parts. Undersurface dark grey to dull brownish-grey. Black on head usually extensive and in some specimens extending between and behind the ears as a line on each side of the neck. Scattered long white hairs on neck and back.

Measurements.—Six adults measured: Total length 716 mm. (680–750); tail 213 mm. (177–230); hind foot 100 mm. (91–102); weight 13 pounds (11–15).

Distribution.—The Rocky Mountains north of Banff and the mountains of the northern half of the Province east of the Coast

Range. Specimen records: Fort Halkett, Klappan River, Laurier Pass, head of Finlay River, Level Mountain, McConnell Creek near Sustut Mountains, Sheslay River, Fort Graham, Tatletuey Lake, Driftwood Mountains, Omineca Mountains, Stuart Lake, Thudade Lake, Moose Pass, Nine Mile Mountain near Hazelton, Wells Gray Park, Barkerville, Tonquin Pass. Sight records by Sheldon (1932) from Needham Creek to Prophet River.

Marmota caligata raceyi Anderson

Anderson, Nat. Mus. Canada, Ann. Rept. 1931: 112, 1932. Type locality, Itcha Mountains, British Columbia.

Distinctions.—Differs from other races in having little of the usual brownish wash over the lower back and rump. Underparts predominantly dark grey, darker even than in *oxytona*. Black ear patch large and conspicuous.

Measurements.—Average of three adult males: Total length 739 mm. (710–757); tail 209 mm. (202–214); hind foot 100 mm. (98–102); weight 19 pounds (10–25). One adult female measured 714 mm., 190 mm., 96 mm., and weighed 25 pounds.

Distribution.—Probably occurs in all the mountains of the western Chilcotin. Specimens from 30 miles east of Bella Coola, Itcha Mountains (52° 45′ N. and 125° W., the type locality), Mount Brilliant, mountains south-west of Burns Lake (probably from mountains south of Wistaria).

Vancouver Marmot

Marmota vancouverensis Swarth

Swarth, Univ. Calif. Publs. Zool. 7:201, 1911. Type locality, Mount Douglas (near Alberni), Vancouver Island, British Columbia.

Description.—In fresh pelage dark chocolate brown all over, without white marking on face or feet except for some white clouding around the nose and occasionally some white spotting on the abdomen. In early summer fades to a rusty brown. Incisors pale yellowish-white.

Measurements.—Seven adult males: Total length 674 mm. (632–710); tail 221 mm. (200–300); hind foot 98 mm. (90–

102). Three adult females: 697 mm. (680–720); 213 mm. (190–240); 103 mm. (100–105); weight (2), 6¾ and 8¼ pounds.

Habitat.—Alpine and upper sub-alpine meadows, rarely wandering to lower elevations.

Biology.—Little known, a much quieter animal than *caligata,* seldom whistles, very local in its distribution and seldom numerous. Hibernates before mid-September.

Distribution.—Found only on Vancouver Island, where it is known from Jordan River north to the Forbidden Plateau. Locality records: Jordan River, Green Mountain, Douglas Peak, Mount Arrowsmith, Mount Burgess and Mount Washington on Forbidden Plateau.

GENUS CITELLUS—GROUNDSQUIRRELS

Columbian Groundsquirrel

Citellus columbianus columbianus (Ord)

Ord, Guthrie's Geog., 2nd Amer. ed., 2:292, 1815. Type locality, between forks of Clearwater and Kooskooskie Rivers, Idaho.

Description.—General body colour greyish, washed with brown and obscurely spotted or barred with yellowish-brown; sides of neck smoke grey; hind legs and feet bright tawny yellow or yellowish-buff. Nose and face yellowish-buff in sharp contrast with rest of head.

Measurements.—Eleven specimens, 9 females and two males, averaged: Total length 356 mm. (335–395); tail 99 mm. (83–119); hind foot 50 mm. (44–56).

Habitat.—Extremely variable; occurs on the alpine meadows and in the arid grasslands and brushy edges of the stream-side meadows at low elevations in the arid south-eastern and south central parts of the Province.

Biology.—Varies with the habitat. Generally colonial, living in burrows either in shelter or in the open. Noisy with a high-pitched chirping alarm note. Hibernation or æstivation occupy from seven to eight months of the year regardless of altitude. The animals become dormant in low-level arid areas as early as mid-July, and on the alplands by the middle of August. Emergence is from early March to late April or May, depending upon the local conditions. Young number from two to seven (average 3.5) and are born after a gestation period of twenty-four days. Food includes a variety of plant material, including grasses, herbs, bulbs, seeds, and fruits; insects are frequently eaten. This squirrel is an important predator on ground-nesting birds in its vicinity.

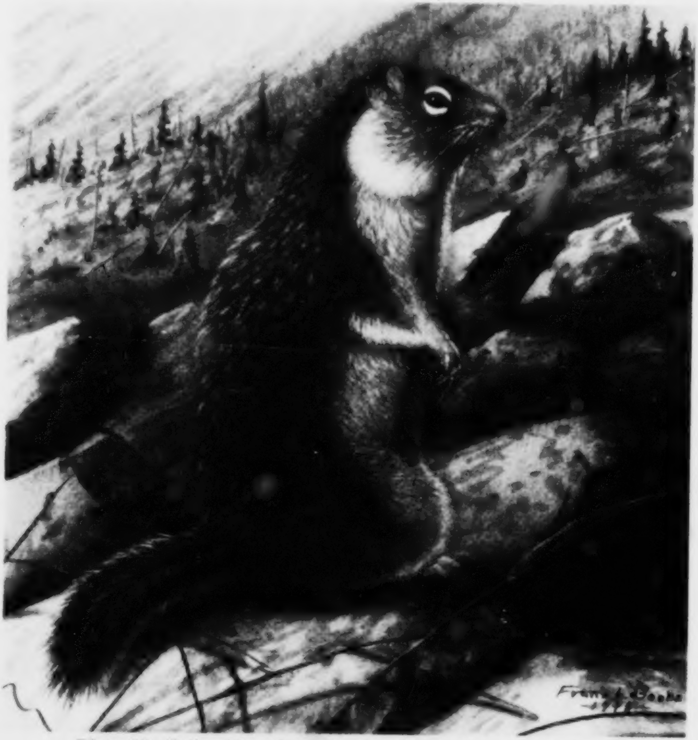


Plate 20. Columbian Groundsquirrel, *Citellus columbianus*.

Distribution.—Occupies the Rocky Mountains north at least to the headwaters of the Smoky River, the Selkirks, Monashee Range, the mountains west of the north Thompson River, and, locally at least, the valleys between these ranges. Localities represented: Yellowhead Pass, Wolverine Pass, Mount Assiniboine, Tornado Pass, Corbin, Indianpoint Lake, Murphy (Eagle) Lake, Lac la Hache, Bridge Lake, Rayleigh, Wells Gray Park, Shuswap, Mount Revelstoke, Glacier, Okanagan Landing, Vernon, Okanagan Falls, Ashnola River, Midway, Nelson, Creston, Cranbrook, Paradise Mine, Canal Flats, Fernie, Cascade, Arrowhead, Phoenix. At the lower levels, however, distribution is by no means uniform, and isolated colonies may appear and disappear over the years.

Parry Groundsquirrel

Citellus parryi plesius (Osgood)

Osgood, North Amer. Fauna *19*:29, 1900. Type locality, Bennett, British Columbia.

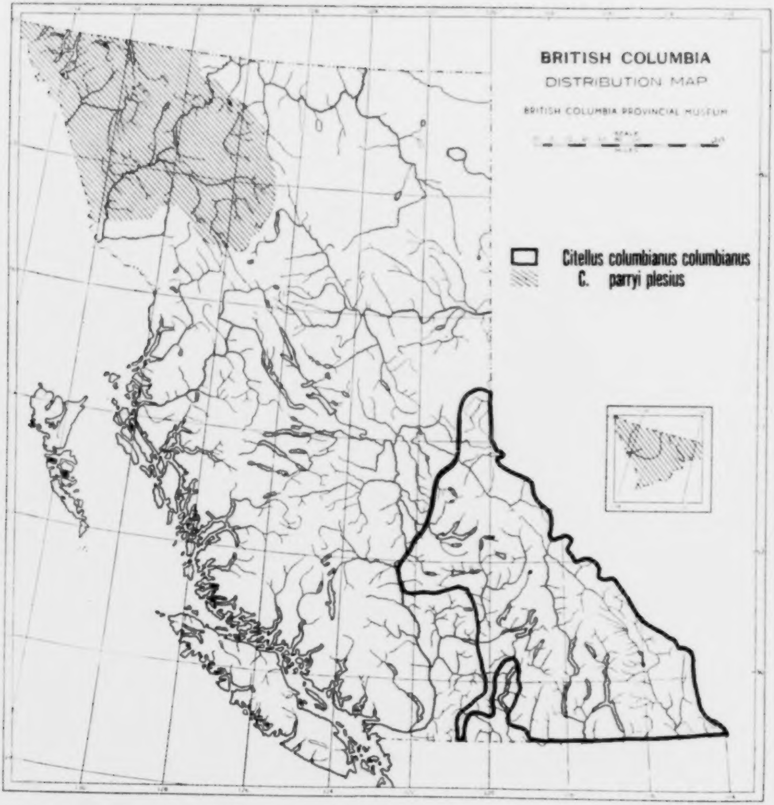
Description.—A large groundsquirrel; general tone of upper parts buffy grey, back with whitish spots that are sometimes almost obsolete; sides and underparts in summer tawny to pale buff, in winter greyish-white, washed with buff; feet and abdomen cinnamon; head tawny; underside of tail bright tawny, faintly edged in black.

Measurements.—Ten adult males measured: Total length 339 mm. (320–363); tail 95.5 mm. (85–105); hind foot 54 mm. (50–57). Eight adult females measured: Total length 329 mm. (300–352); tail 90 mm. (85–102); hind foot 53 mm. (52–54). (Howell, 1938.)

Habitat.—Sub-alpine brushy meadows seldom above timberline.

Biology.—Has a longer active season than *C. columbianus*. First animals often appear in March and activity continues into September. Young are born from mid-May to mid-June; little is known of litter size or of food habits.

Distribution.—The north central region from Bennett Lake to Teslin Lake and Dease Lake and south to the headwaters of the Spatsizi and Klappan Rivers, southern tributaries of the Stikine


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Citellus columbianus columbianus
C. parryi plesius

Map 16. Distribution of the Columbian Groundsquirrel, *Citellus columbianus,* and of the Parry Groundsquirrel, *Citellus parryi.*

River. Representative localities: Stonehouse Creek near junction with Kelsall River, Bennett, Atlin, Cassiar Mountains, McDame Creek, Sheslay River, Telegraph Creek, Spatsizi River (head), Klappan River (head), Tatletuey Lake, Glenora Mountain.

Cascade Mantled Groundsquirrel

Citellus saturatus (Rhoads)

Rhoads, Proc. Acad. Nat. Sci. Phila. *47*:43, 1895. Type locality, Lake Keechelus, Kittitas County, Washington.

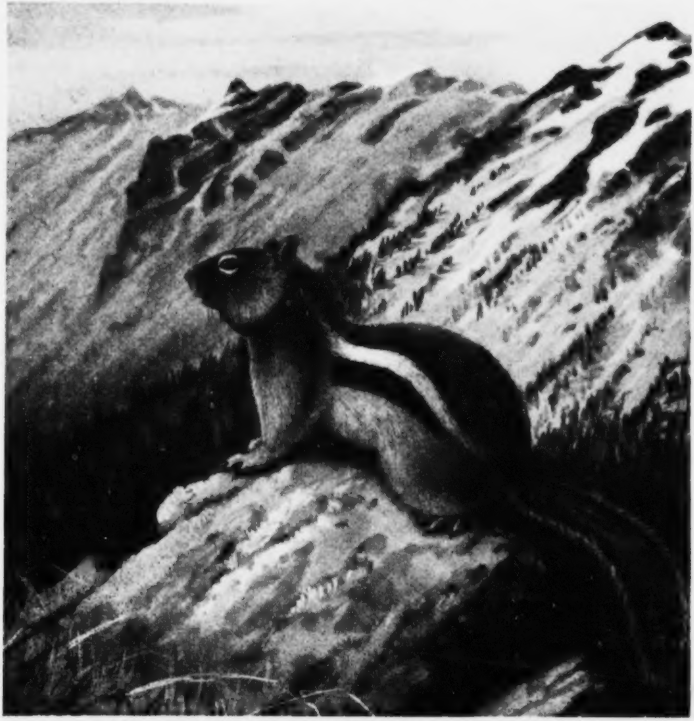


Plate 21. Mantled Groundsquirrel, *Citellus lateralis.*

Description. — The largest of the mantled groundsquirrels. Dorsal parts dull pinkish-grey brown, underparts pale buff. Mantle obscure, but head and neck and shoulders in summer pelage washed with russet. A whitish stripe down each side of the back from ears to rump, bordered on the outside by a dark stripe, often an inner dark stripe also; sides warm buff; front feet cinnamon buff, hind feet pinkish buff; tail greyish above, below yellowish-brown margined with black, hair-tips pale. Eyelids whitish. A small, diamond-shaped dark area of shorter fur in the middle of the back of most specimens gives it the local name of "diamond back." Winter pelage in May similar but paler.

Measurements.—Six adult males: Total length 308 mm. (301–320); tail 106 mm. (99–115); hind foot 48 mm. (45–53); weight of four males averaged 274 grams. Five adult females: Total length 281 mm. (245–315); tail 100 mm. (94–105); hind foot 44 mm. (43–46); weight of seven females (Dalquest, 1948) averaged 234 grams (about 8 ounces).

Habitat.—Frequents talus and broken rock, or areas where stumps and fallen timber provide shelter; from the floor of the main valleys up to at least 7,000 feet elevation.

Biology.—The food of this groundsquirrel is largely the fruit and seeds of plants. Nothing is known of the period of hibernation. A female taken at Princeton on May 8th was carrying seven fœtuses.

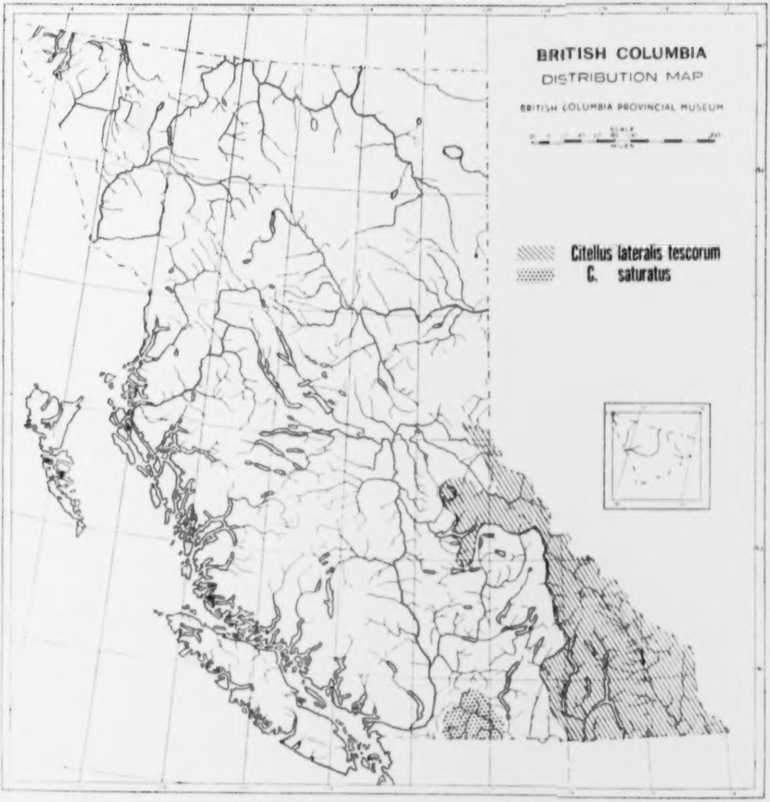
Distribution.—Confined to an area on and east of the summit of the Cascade Mountains and largely west or south of the Similkameen-Tulameen Rivers. The northern limits are not known. Specimens from Ashnola River, Lightning Lakes, Skagit River, Tulameen, Princeton, Hedley.

Mantled Groundsquirrel

Citellus lateralis tescorum (Hollister)

Hollister, Smithsonian Misc. Coll., *56*:2, 1911. Type locality, head of Moose Pass branch of the Smokey River, Alberta.

Description.—Colour pattern distinctive; a longitudinal white stripe on either side of the back, each bordered on each side by a pronounced black stripe. General dorsal colour warm brownish-grey, becoming pale buff on the lower sides and paler still on the


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Citellus lateralis tescorum
C. saturatus

Map 17. Distribution of the Mantled Groundsquirrels, *Citellus lateralis* and *Citellus saturatus*.

abdomen. In summer pelage the head and shoulders bear a "mantle" of rich hazel. Conspicuous white line above and below the eye. By the following spring the mantle area is faded and less conspicuous. The richly coloured mantle, strongly marked inner black stripe, and pale yellowish-white sides separate this species from *C. saturatus.*

Measurements.—Twelve of both sexes measured: Total length 287 mm. (270–315); tail 102 mm. (95–115); hind foot 43.3 mm. (40–45).

Habitat.—Variable; occurs in the rock-slides above timber-line and in rocky places down to valley-bottom levels in semi-arid areas. Also inhabits recently burned pine forests where an abundance of stumps and fallen tree-trunks provide shelter and the open habitat produces an abundance of berry-bearing shrubs and flowering plants.

Biology.—Food consists of seeds and fruits, bulbs, mushrooms, and a variety of the richer food sources of vegetable origin. Meat is sometimes eaten when a dead bird or mammal is discovered. Large quantities of seeds are stored underground. Young, three to seven in litter, and the single litter is born in May. The gestation period is not known. Hibernation begins in late August, earlier in more arid areas, the older animals retiring first. They appear again in April or early May.

Distribution.—It occurs in the Rocky Mountains from the International Boundary north to Mount Selwyn. In the south it extends westward to the east side of the Okanagan Valley. Selected localities of occurrence are Mount Selwyn, head of Parsnip River, Wapiti Pass, Sukunka River, Barkerville, Moose Pass, Goat Peak in Wells Gray Park, Glacier, Thompson Pass, Assiniboine, Toby Creek, Creston, Revelstoke, Rossland, Monashee Pass, Slocan Lakes, Ymir.

GENUS EUTAMIAS—CHIPMUNKS

Four species of chipmunks occur in the Province, and three of them are so similar in superficial characters that it is almost impossible to convey the distinctions in a written description. In several places, two species occur together without interbreeding, and in the southern Rockies three species similarly occupy the same general area. There is, however, a rather sharp ecological separation, with one species (the least chipmunk) on the arid rocky slopes above timber-line, another (the rufous-tailed chipmunk) in the thickets and small meadows at and below timber-line, and the third (the northwestern chipmunk) at the lower elevations. While colour differences may be hard to describe effectively, the species are distinct not only in this way, but in call notes and in many details of behaviour to a degree that once you are familiar with them field identification is usually easy.

The species are plastic and have given rise to many subspecies; however, it is generally true that in any given region the subspecies of each species are quite distinctive even though geographically remote subspecies of the same species may be virtually indistinguishable.

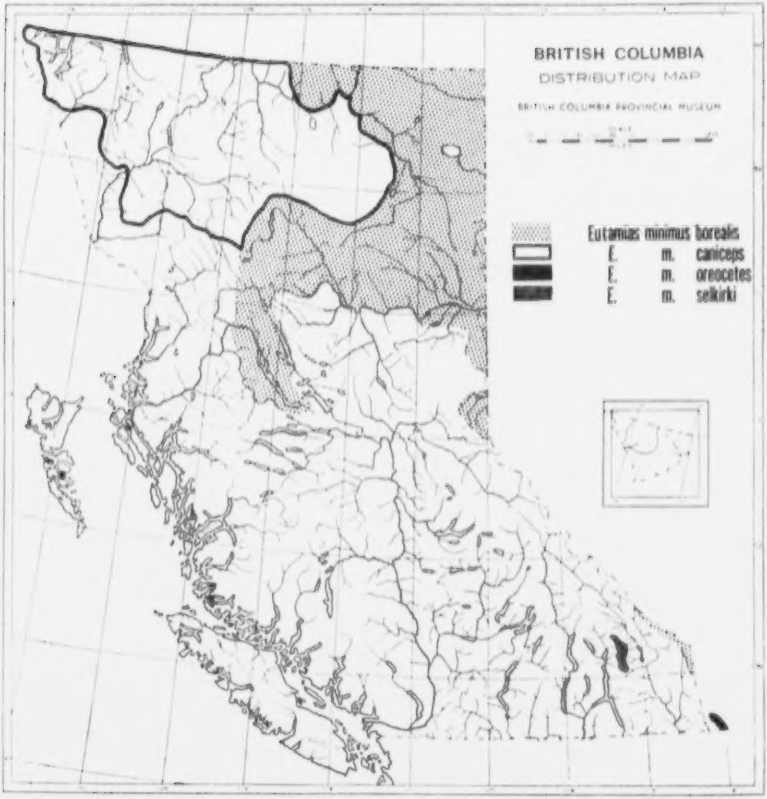
The species all have in common the distinctive striped colour pattern with a mid-dorsal and two lateral dark stripes separated and bordered by four pale stripes. In all, also, there are two pale stripes along the face—one above and one below the eye. These separate three dark stripes, the central one passing through the eye.

In all there are two seasonal moults, in which the males moult first. The summer pelage is assumed in June or July, with some nursing females as late as August. It is brighter and generally more reddish than the winter pelage. The autumn moult takes place gradually in September or October.

Least Chipmunk

Eutamias minimus (Bachman)

Description.—The smallest of the chipmunks, with total length not more than 225 mm., tail averaging 107 mm. and hind foot 31 mm. in *borealis,* the largest race. In general the body colour is greyish-brown, greyer on the rump than all but one of the races of *amœnus.* Dark stripes black and inner light stripes white, outer light stripes pale buff or whitish. Top of head grey with an intermixture of brown hairs. Underparts white, underside of tail about clay colour.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Eutamias minimus borealis
E. m. caniceps
E. m. oreocetes
E. m. selkirki

Map 18. Distribution of the Least Chipmunk, *Eutamias minimus.*

Habitat.—Variable; usually at or above timber-line, but one subspecies (*borealis*) descends to lower elevation and occurs in the parkland, recently deforested areas, and forest-edge communities.

Biology.—Food is largely berries and seeds; but insects and other animal matter are taken also; large quantities of seeds are stored below ground in the animal's burrow. The species hibernates from September until late April or May, depending upon local circumstances. Young number from two to six; average is five. One litter is born per year, usually in May.

SUBSPECIES

Eutamias minimus borealis (Allen)

Allen, Monogr. North Amer. Rodentia, U.S. Geol. Geogr. Surv. Terr., Rep., II: 793, 1877. Type locality, Fort Liard, Northwest Territories.

Distinctions.—The largest and most widely distributed of the subspecies. General tone of upper part more tawny and less greyish than in the other races, sides brighter, almost hazel brown. Fore and hind feet pale buff. Underparts white, underside of tail clay colour to cinnamon margined with black and with hair-tips yellowish.

Measurements.—Average and extremes of ten adults (males) from the Rocky Mountains and Peace River: Total length 195 mm. (180–202); tail 87 mm. (70–94); hind foot 32 mm. (29–34). Ten adult females: Total length 208 mm. (192–208); tail 93 mm. (81–100); hind foot 32 mm. (30–33).

Distribution.—Across the Province in the northern part of eastern Skeena drainage and in the Peace River drainage. Specimen records from Sustut River, Babine Mountains, Bear Lake, head of Chapatan River, Tetana Lake, Thutade Lake, Fort Grahame, Hudson Hope, Ingenika River, Tocha Lake, Tatletuey Lake, head of Wapiti River, Nabesche River, Sikanni Chief River, Charlie Lake, Tupper Creek, west along the Alaska Highway to Beatton River, 115 miles south of Fort Nelson, Minaker River, Muskwa and Steamboat Mountains. Farther south its range lies entirely east of the Rocky Mountains at low elevations until the latitude of

Banff, Alberta, where it reaches timber-line and enters British Columbia; specimens from Assiniboine and Tornado Pass.

Eutamias minimus caniceps Osgood

Osgood, North Amer. Fauna *19*:28, 1900. Type locality, Lake Lebarge, Yukon.

Distinctions.—Similar to *borealis* but more greyish, particularly upon head and rump; sides paler; tail greyish-buff beneath and much paler than in *borealis*. Hind foot larger.

Measurements.—Average of five adults from Bennett (Howell, 1929): Total length 216.8 mm. (203–225); tail 95 mm. (84–99); hind foot 33.6 mm. ((33–34). Skull as in *borealis.*

Distribution.—Northern British Columbia west of longitude 125° and generally north of the 58th parallel of latitude. Specimens from Atlin, Bennett Lake, Cheonee Mountains, junction of Irons Creek and Liard River, 10 miles south and 21 miles east of Muncho Lake, Summit Pass, 10 miles south and 70 miles west of Fort Nelson, Spatsizi River, Muncho Lake, mouth of Dease River, McDame Pass on Dease River, Telegraph Creek, Groundhog Mountain.

Eutamias minimus oreocetes Merriam

Merriam, Proc. Biol. Soc. Wash. *11*:207, 1897. Type locality, Summit Mountain, Flathead County, Montana.

Distinctions.—Paler than *borealis,* dorsal stripes more nearly black and pale stripes whiter; ears without black spots; underside of tail darker. Tail shorter than in *borealis.*

Measurements.—Two females from Waterton Lakes Park, Alberta, measured: Total length 185 mm., 210 mm.; tail 87 mm., 90 mm.; hind foot 34 mm., 30 mm.; weight of the larger one 55.6 grams.

Distribution.—The southern Rockies, found in typical form in the vicinity of Akamina Pass. Specimens from Assiniboine and from Tornado Pass were regarded (by Crowe, 1942) as of this race, but they are intermediate and in our opinion closer to *borealis.*

Eutamias minimus selkirki Cowan

Cowan, Proc. Biol. Soc. Wash, 59:113, 1946. Type locality, Toby Creek, 19 miles west of Invermere, British Columbia.

Distinctions.—Differs from *oreocetes* in darker body colour, rump and hind legs in August grey rather than greyish washed with yellowish-brown; upper tail surface darker; facial stripes darker and more extensive; crown darker and more greyish rather than brownish in tone. From *borealis* it differs in shorter tail; white rather than brown feet, along with other characteristics.

Measurements.—An adult male and female measured respectively: Total length 189 mm., 204 mm.; tail 85 mm., 91 mm.; hind foot 32 mm., 34 mm.

Distribution.—Found only in the south-eastern parts of the Selkirk Range, known only from the type locality, Paradise Mine, Toby Creek, timber-line environment.

Northwestern Chipmunk

Eutamias amœnus (Allen)

Description. — Similar to *minimus* in colour and cranial characters but in any given locality of joint occupancy larger in size and with longer tail. Body colours darker and richer, with general tones brown rather than grey (except in *affinis*) and underside of tail ochraceous-brown or darker rather than in yellow or grey tones. Under parts white or buff.

Habitat.—Generally at medium elevations, but does ascend to timber-line. Frequents rocky or broken terrain and edges of open places where shelter is available in brush tangles and fallen timber. Its distribution includes both extremes of humidity.

Biology.—Food similar to that of the other chipmunks. Hibernation from September or October to April. Summer nests often made in hollow logs or abandoned woodpecker nests. Winter nests in burrows underground, usually entering beneath a dead tree-stump or among stones. Young number four to eight and are born in May or later, depending upon the local circumstances.

SUBSPECIES

Eutamias amœnus affinis (Allen)

Allen, Bull. Amer. Mus. Nat. Hist. *3*:103, 1890. Type locality, Ashcroft, British Columbia.

Distinctions.—The palest member of the species, most distinctive in winter pelage when body colour is mainly grey, dark stripes black and light stripes white. Sides yellow-brown, under parts white. In summer pelage rump grey with a vinaceous tone; sides brighter than in winter. Underside of tail clay colour, about as in *minimus*.

Plate 22. Northwestern Chipmunk, *Eutamias amœnus*.

Measurements.—Eight adult males measured: Total length 214 mm. (195–219); tail 96 mm. (80–103); hind foot 32 mm. (31–34). Ten females are respectively 222 mm. (208–245); 97mm. (84–106); 33 mm. (31–36).

Distribution.—The Okanagan, Thompson, Nicola, and Similkameen Valleys and the arid east bank of the Fraser River to Sorenson Lake. Specimen records from Sorenson Lake, Clinton, Bootahnie Valley, Lytton, Pavilion, Ashcroft, Lillooet, Kamloops, Glimpse Lake, Nicola, Princeton, Hedley, Okanagan Mission, and many localities down the Okanagan Valley, Ashnola River, Black Pines 20 miles north of Kamloops, Osoyoos–Bridesville summit, Midway. This race intergrades with *luteiventris* over a broad area in the south central part of the Province through which the chipmunks are like *luteiventris* at higher elevations and like *affinis* in the valleys.

Eutamias amœnus felix (Rhoads)

Rhoads, Amer. Nat. 29:941, 1895. Type locality, Church Mountain, Mount Baker Range, British Columbia.

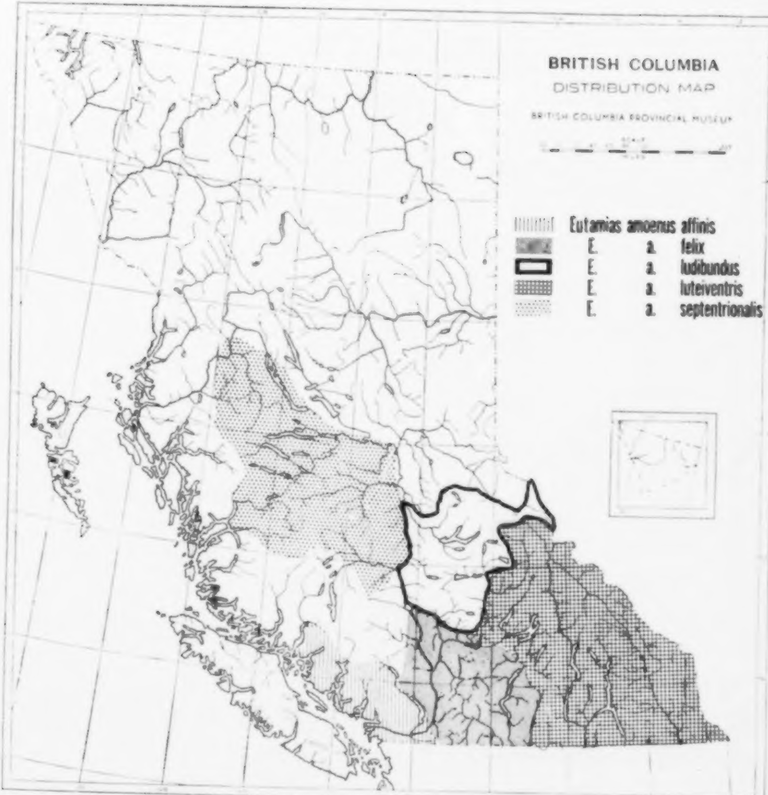
Distinctions.—The darkest coloured of all the subspecies. The entire upper parts are rich brown, the light stripes ochraceous rather than white, sides rich tawny or hazel, underparts either white or faintly buff; in occasional individuals brown, almost as on the back. Three median dark stripes ending at the same level on base of tail. Tail darker above and below than in any other race. Size larger than *affinis* with relatively longer tail and hind foot.

Measurements. — Ten adult males: Total length 221 mm. (218–225); tail 98 mm. (91–106); hind foot 33.5 mm. (32–35). Ten females measured correspondingly 229 mm. (220–235); 103 mm. (93–115); 34 mm. (30–38).

Distribution.—From Bute Inlet south into the State of Washington and east into the western part of Manning Park. Confined to the west slope of the Cascade and Coast Ranges from sea-level, where the mountains rise directly from the beach to timber-line. Not found on the Fraser River delta region. Specimen records from Fawn Bluff, Purcell Point, Lund, Savary Island, Gibsons Landing, Alta Lake, North Vancouver, Port Moody, Coquitlam, Mount Baker Range, Lihumitson Park, Ranger Station in Manning Park. Intergrades with *affinis* along the summit of the Cascade Range in Manning Park.

Eutamias amœnus ludibundus Hollister

Hollister, Smiths. Misc. Coll. 56:1, 1911. Type locality, Yellowhead Lake, British Columbia.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Eutamias amoenus affinis
E. a. felix
E. a. ludibundus
E. a. luteiventris
E. a. septentrionalis

Map 19. Distribution of the Northwestern Chipmunk, *Eutamias amœnus.*

Distinctions. — The characters of this subspecies have been misunderstood through failure to consult series from the type locality. It is the most richly coloured of all the races other than *felix*, which it closely resembles, but differs in having the two dark stripes on each side of the median, one terminating ½ to ¾ inch above the median stripe, rather than the three stripes ending at the same level at the base of the tail. The upper parts are a rich brown, including the rump, sides bright tawny, the colour of the underside of the tail is diagnostic, being bright rufous, almost identical with that of *ruficaudus*. Under parts white.

Measurements.—Eighteen topotypes measured: Total length 212 mm. (205–230); tail vertebræ 95 mm. (86–104); hind foot 33.5 mm. (32–35).

Distribution.—The central Rocky Mountain region and westward to Barkerville. Specimen records from Moose Lake, Yellowhead, Indianpoint Lake, Lac la Hache, Horse Lake, Clearwater Lake in Wells Gray Park. The specimens from the Cascade Range in British Columbia and Washington ascribed to this race by Howell (1929) are quite unlike topotypes.

Eutamias amœnus luteiventris (Allen)

Allen, Bull. Amer. Mus. Nat. Hist. *3*:101, 1890. Type locality, Waterton Lake, Alberta.

Distinctions.—This subspecies is paler than *ludibundus* and darker than *affinis*. The general dorsal tone is vinaceous brown rather than grey. The most distinctive characteristic is the buff under parts. The underside of the tail is tawny, much paler than in *ludibundus*.

Measurements.—Average of ten adults from region of type locality: Total length 221.5 mm. (212–230); tail 101.8 mm. (95–107); hind foot 33.2 (32–34).

Distribution.—The entire south-eastern part of the Province from the International Boundary north-west to Revelstoke and Rayleigh, west to the Monashee Range, but intergrading altitudinally with *affinis* over a wide area. Selected localities: Tornado Pass, Fernie, Kootenay Crossing, Glacier, Kinbasket Lake, Mount Revelstoke, Shuswap, Sicamous, Salmon Arm, Rayleigh, Monashee

Pass, Anarchist Mountain, Midway, Sirdar, Nakusp, Trail, Yahk, Newgate, Vermilion Crossing, Radium Hot Springs, Crowsnest Pass, 19 miles west of Invermere. Specimens from Phoenix, Cranbrook, and on the west side of the Kootenay River at Newgate approach the characteristics of *canescens.*

Eutamias amœnus septentrionalis Cowan

Cowan, Proc. Biol. Soc. Wash. 59:110, 1946. Type locality, Ootsa Lake, British Columbia.

Distinctions.—Differs from *ludibundus* in having rump drab or greyish-olive, thus distinctly greyer, and underside of tail much paler, near pinkish-cinnamon instead of between rich tawny and cinnamon buff. Under parts white. Winter pelage distinctive with all the dark stripes broad and black, and sides of body cinnamon buff. Body significantly longer. Like *affinis* but easily distinguishable in winter pelage when all dark stripes are black without brownish wash, and inner light stripes brownish-grey rather than clear grey. For further distinctions *see* Cowan (1946).

Measurements.—Fifteen adults: Body length 123 mm. (114–130); tail 95 mm. (89–100); hind foot 33 mm. (31–35).

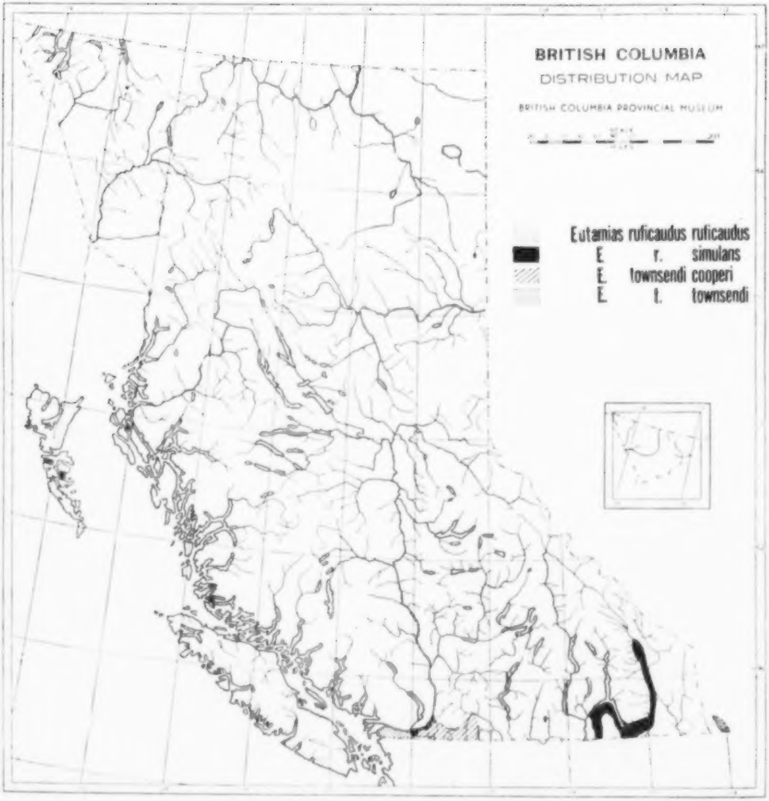
Distribution.—The central plateau and mountain region west of the Fraser River, north to the Skeena Valley. Specimen records: Ootsa Lake, west end of Eutsuk Lake, Anahim Lake, Chezacut Lake, Itcha Mountains, Nulki Lake, Babine Lake, Kimsquit, Stuie, Cariboo Mountain near Atnarko River, Rainbow Mountains, Stum Lake, Hanceville.

Rufous-tailed Chipmunk

Eutamias ruficaudus Howell

Description.—A large dark-coloured chipmunk. Dorsal surface deep tawny, light stripes greyish often mixed with reddish-brown, dark stripes black, under parts white; underside of tail rufous or ochraceous tawny. Hind feet pinkish-cinnamon.

Habitat.—The clumps of stunted pines and spruce-trees, mountain rhododendron, and blueberry-bushes that constitute the margins of timber-line meadows are the habitat of this species in the


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Eutamias ruficaudus ruficaudus
E. r. simulans
E. townsendi cooperi
E. t. townsendi

Map 20. Distribution of the Rufous-tailed Chipmunk, *Eutamias ruficaudus*, and of the Townsend Chipmunk, *Eutamias townsendi*.

Rocky Mountains. The race *simulans* may be a form of lower elevations.

Biology.—Nothing is known.

SUBSPECIES

Eutamias ruficaudus ruficaudus Howell

Howell, Proc. Biol. Soc. Wash. *33*:91, 1920. Type locality, Upper St. Mary Lake, Glacier County, Montana.

Distinctions.—The large size, large hind foot (35 mm.), and short tail, along with the brilliant rufous undertail, are distinctive. Voice and behaviour unlike any of the other chipmunks of the Province.

Measurements.—Nine adults from Akamina Pass region measured: Total length 225 mm. (211–235); tail 95 mm. (90–102); hind foot 35 mm. (34–36).

Distribution.—Known only from the extreme southern Canadian Rockies. Specimens from Akamina Pass and from Sage Pass.

Eutamias ruficaudus simulans Howell

Howell, Journ. Mamm. *3*:179, 1922. Type locality, Coeur d'Alene, Kootenai County, Idaho.

Distinctions.—Like *ruficaudus*, but back, sides, and undertail paler. Quite similar to the geographically remote *T.a. felix*. Often closely similar to *luteiventris*, but rump greyer and underparts white.

Measurements. — Sixteen males from northern Idaho (Orr 1936) measured: Total length 219 mm. (207–246); tail 95.5 (82–111); hind foot 32.6 (31–35); nineteen females had essentially the same dimensions.

Distribution.—Specimens recorded from Invermere, Nelson, Salmo River, Creston.

Townsend Chipmunk

Eutamias townsendi (Bachman)

Description.—The largest of all the chipmunks and distinctive also for its rich brown colour that renders the dark stripe less conspicuous. The sharp colour contrasts of the other species are all subdued in this one; light stripes ochraceous, never white. Underparts white. Tail bushy, dark brown above, tawny beneath.

Habitat.—The heavy forests of the western slope of the Cascades, where it seeks the edges of clearings, lake-shores, streamsides, and along abandoned forest roads.

Biology.—Food includes wild berries and seeds, also such larger items as hazel-nuts. Young number three to six; breeding takes place as early as April and births take place in May.

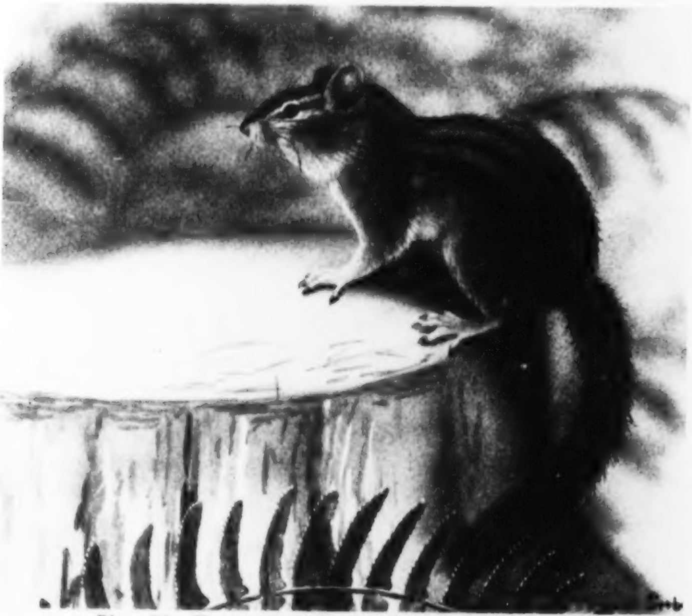


Plate 23. Townsend Chipmunk, *Eutamias townsendi.*

SUBSPECIES

Eutamias townsendi townsendi (Bachman)

Bachman, Journ. Acad. Nat. Sci. Phila. *8*:68, 1839. Type locality, Lower Columbia River, Oregon.

Distinctions.—Differentiated from the next race by its richer, more yellow-brown dorsal colour, and by having the outer light stripes ochraceous, not grey.

Measurements. — Ten adult males: Total length 254 mm. (246–263); tail 113 mm. (104–119); hind foot 37 mm. (34–40). Six adult females were larger: Total length 271 mm. (265–280); tail 124 mm. (120–130); hind foot 38 mm. (37–39).

Distribution.—The delta of the Fraser River, south of the river itself, and extending on to the lower slopes of the mountains. Localities of occurrence: Chilliwack, Huntingdon, Langley, Church Mountain, Skagit, Sumas, South Westminster (*see* Map 20).

Eutamias townsendi cooperi (Baird)

Baird, Proc. Acad. Nat. Sci. Phila. 7:334, 1855. Type locality, Kilckitat Pass, Skamania County, Washington.

Distinctions.—Differentiated by the greyer tone of the dorsal body colour, and by having the outer light srtipes greyish-white rather than ochraceous.

Measurements.—As in *townsendi.*

Distribution.—This race inhabits the higher elevations and intergrades altitudinally with *townsendi* of the flat lands of the delta. Localities of occurrence: Lightning Lakes near Allison Pass, Chilliwack Lake, Hope, Lihumitson Park. The Huntingdon specimens referred to this race by Howell (1929:111) are intergrades with *townsendi,* the population being near that race.

GENUS SCIURUS—TREE SQUIRRELS

Gray Squirrel

Sciurus carolinensis pennsylvanicus Ord

Ord *in* Guthrie, A New Geographical, Historical, and Commercial Grammar. Philadelphia, ed. 2, 2:292, 1815. Type locality, Pennsylvania west of the Alleghany Ridge.

Description.—Larger than the red squirrel with proportionately longer tail. Tail more bushy than in red squirrel. Body colour grey or black; grey individuals have variable amounts of white tipping on the body hairs and usually a brownish wash over the back. Underparts of grey individuals white. Feet grey.

Measurements.—Average and extremes of eleven adults from Stanley Park: Total length 481 mm. (440–520); tail 224 mm. (190–240); hind foot 68 mm. (63–72).

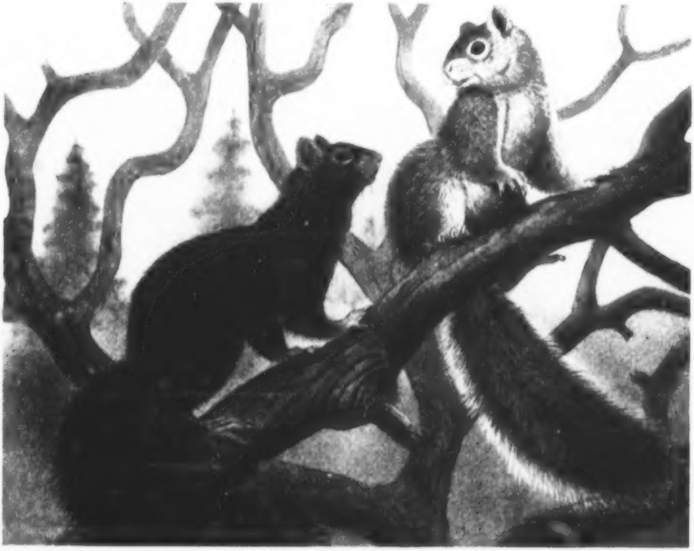


Plate 24. Gray Squirrel, *Sciurus carolinensis.*

Habitat. — Mixed forest that includes a high proportion of broad-leafed and vine maples.

Biology.—Buds, leaves, fruit, and seeds, largely of the deciduous trees, comprise the food of this squirrel. Nests of small sticks, dry leaves, shredded cedar bark, and other fine vegetable matter are usually placed in the tops of coniferous trees. Cavities in trees are used extensively as nest-sites. Adult females may have two litters per year, born in May and July. Yearling females apparently have but one litter during their first breeding year.

Unborn litters average three young, but the average number of young weaned per female per season is 1.6. The breeding season begins in March, the gestation period is forty-four days. A spring density of 0.72 squirrels per acre has been determined.

Distribution.—Confined to the peninsula of Stanley Park at Vancouver, where three or four pairs were introduced about 1914 and have maintained a saturated population since about 1920.

GENUS TAMIASCIURUS—RED SQUIRRELS AND CHICKAREES

Red Squirrel

Tamiasciurus hudsonicus (Erxleben)

Description.—Upper parts from grey to olive brown with a reddish wash heaviest along midline. Underparts white or greyish-white; tail as long as body, flattish but bushy, upper side same as back, lower side usually paler. Tips of tail hairs black, sometimes tail-tip black. A black line, brighter in summer than in winter, runs along the side and separates the colour of the upper parts from that of the abdomen. Ears, particularly in winter, with an elongated " pencil " of hair from the tips.

Habitat.—Occurs in forested plant communities, usually those dominated by coniferous trees.

Biology.—Food consists largely of seeds of conifers, flower and leaf buds of poplar, birch, and other trees, mushrooms and some fruits. Will take young birds and the flesh of dead animals, upon occasion. Large quantities of food stored for winter use, usually consists of cones buried in or heaped upon the ground, or dry mushrooms placed in the fork of a branch near the base of a tree. Nests are constructed of finely shredded plant material and are either in burrows, cavities in trees, or on sheltered basal branches, usually within 6 or 8 feet of the trunk. The red squirrel is hibernatory in part, becoming torpid during periods of severe weather. Young number one to six, an average of four. There is one litter per year, born in May or early June. Mating takes place in late April. The red squirrel is an active climber, going both up and down tree-trunks head first; however, it does much of its foraging on the ground.

SUBSPECIES

Tamiasciurus hudsonicus columbiensis Howell

Howell, Proc. Biol. Soc. Wash. *49*:135, 1936. Type locality, Raspberry Creek, 30 miles south-east of Telegraph Creek, British Columbia.

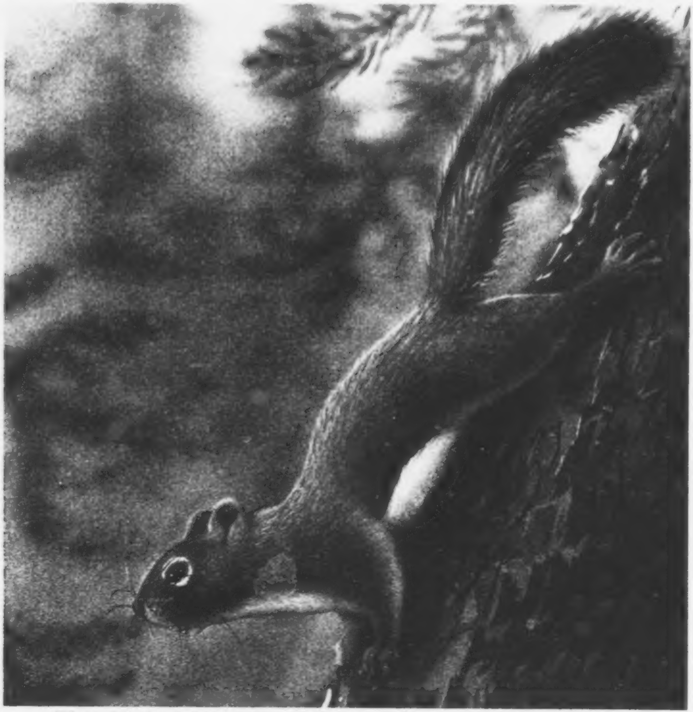


Plate 25. Red Squirrel, *Tamiasciurus hudsonicus* (in summer).

Distinctions.—Dorsal surface yellowish-brown with strong reddish-brown wash, dorsal surface of tail predominantly red, fringed with black; hair-tips yellow. Underparts in summer white, in winter pale grey. The most brightly coloured of the races in the

Province apart from *preblei*. Hind foot smaller and skull measurements less than in *streatori*.

Measurements.—Average of twenty adults from Telegraph Creek (Howell, 1936): Total length 321.7 mm. (306–332); tail 127 mm. (120–138); 49 mm. (47–51).

Distribution.—The entire central part of the Province east of the Coast Ranges from Atlin, Teslin, Muncho Lake, and Steamboat Mountain south-east to Mount Robson, and south to Indianpoint Lake, Lac la Hache, and Lillooet. Localities represented: Teslin, junction of Irons Creek and Liard River, junction of Trout and Liard Rivers, Muncho Lake, 10 miles south and 21 miles east of Muncho Lake, south and 70 miles west of Fort Nelson, Summit Pass, 10 miles from Glenora, Telegraph Creek, Fort Grahame, Indianpoint Lake, Telkwa, Ootsa Lake, Wistaria, Stuie, Hagensborg, Vanderhoof region, Quesnel, Williams Lake, Chezacut Lake, Rainbow Mountains, Lac la Hache, Yellowhead Pass, Moose Lake.

Remarks.—Specimens from the western part of the range (Wistaria, Stuie, Hagensborg) are duller in body colour and with much richer tail colour than the Rocky Mountain specimens. Specimens from the extreme north-western corner of British Columbia show some of the characteristics of *petulans*.

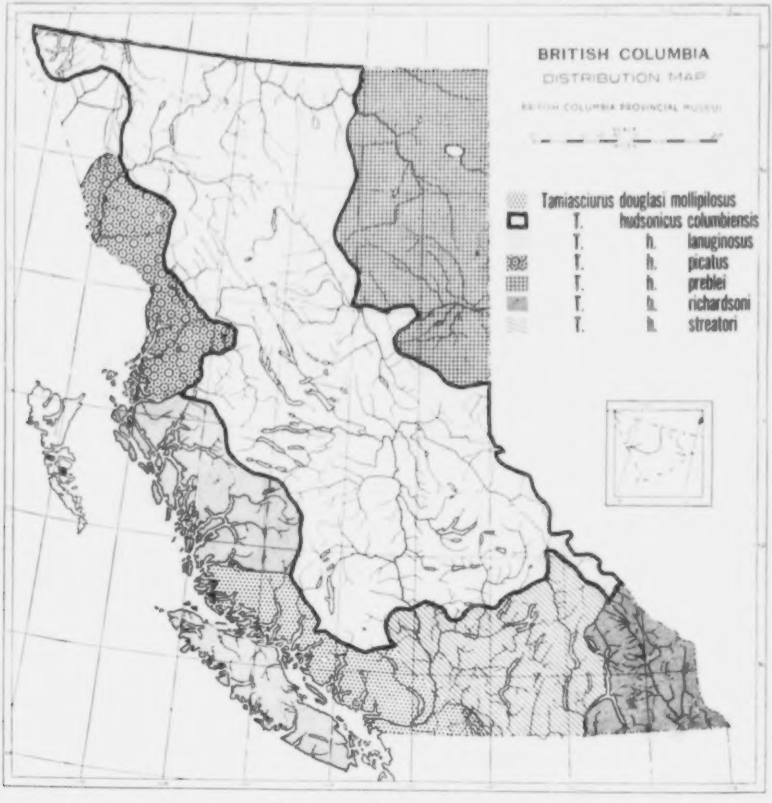
Tamiasciurus hudsonicus lanuginosus (Bachman)

Bachman, Proc. Zool. Soc. London (Pt. 6):101, 1838. Type locality, Fort McLaughlin, Hunter Island, British Columbia.

Distinctions.—A richly coloured race, with dark general body colour and the red of the back about hazel. Underparts in winter greyish, sometimes brown, tail and hind feet shorter than in *picatus*.

Measurements.—Eighteen adult males measured: Total length 297 mm. (285–316); tail 110 mm. (96–125); hind foot 48 mm. (46–52).

Distribution.—Vancouver Island, and the mainland coast and islands from Owikeno Lake, Rivers Inlet north to the mouth of the Skeena River. Locality records from all regions of Vancouver Island, Little Gillard Island, Arran Rapids, Spider, Townsend, Swindle, Calvert, McCauley, Campbell, Hunter, Pitt, Porcher, Yeo,


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Tamiasciurus douglasi mollipilosus
T. hudsonicus columbiensis
T. h. lanuginosus
T. h. picatus
T. h. preblei
T. h. richardsoni
T. h. streatori

Map 21. Distribution of the Douglas Squirrel, *Tamiasciurus douglasi*, and of the Red Squirrel, *Tamiasciurus hudsonicus*.

Dufferin, Horsfall, and Chatfield Islands, Owikeno Lake, Bella Coola, Hagensborg, Lowe Inlet, Neckis River.

Remarks.—For use of the name *lanuginosus* (Bachman) rather than *vancouverensis* (Allen), *see* McCabe and Cowan (1945).

Tamiasciurus hudsonicus picatus (Swarth)

Swarth, Journ. Mammal. *2*:92, 1921. Type locality, Kupreanof Island, Alaska.

Distinctions.—In summer pelage closely like *lanuginosus;* in winter darker than *picatus* to the north but brighter and more reddish than *lanuginosus;* there is a fairly well marked hazel dorsal stripe; centre of tail below reddish rather than grey; black lateral stripe more pronounced; tail-tip with much less black.

Measurements.—Eight males from Alaska (Swarth, 1922): Total length 312 mm.; tail 125 mm.; hind foot 51 mm. Eight females 308 mm., 123 mm., and 51 mm. respectively.

Distribution.—The Coast Range of the northern half of the Province. Specimen records from Great Glacier, Flood Glacier, Hazelton, and southward for an undetermined distance.

Tamiasciurus hudsonicus preblei Howell

Howell, Proc. Biol. Soc. Wash. *49*:133, 1936. Type locality, Fort Simpson, Mackenzie District, Northwest Territories.

Distinctions.—Similar to *columbiensis* but paler.

Measurements.—Average of ten adult males: Total length 332 mm. (310–350); tail 138 mm. (125–148); hind foot 51 mm. (49–51). A similar series of females measured 331 mm. (296–340), 132 mm. (124–142), 49 mm. (48–51).

Distribution.—The Peace River area east of the Rockies from Tupper Creek, north-westward to Muskwa and Lower Liard Crossing. Specimens from Tupper Creek, Charlie Lake, Aylard Creek, Redfern Lake, Muskwa, Lower Liard Crossing.

Tamiasciurus hudsonicus richardsoni (Bachman)

Bachman, Proc. Zool. Soc. London (Pt. 6):100, 1938. Type locality, head of Big Lost River, Custer County, Idaho.

Distinctions.—The most distinctive characteristic of this race is the large amount of black upon the tail. Usually the terminal one-half to one-third is completely black. The general body colour is darker and the dorsum less reddish than in surrounding races.

Measurements.—Average of twenty adults: Total length 336 mm. (321–352); tail 135 mm. (125–142); hind foot 51 mm. (47–54).

Distribution.—The south-eastern corner of the Province, from the International Boundary north through the Rockies to the vicinity of Field; west to Nelson and Trail where it intergrades with *streatori*. Localities represented: Akamina Pass, Tornado Pass, Assiniboine, Invermere, Newgate, Cranbrook, Morrissey, Yahk, Creston, Nelson, Deer Park, Rossland (approaching *streatori*).

Tamiasciurus hudsonicus streatori (Allen)

Allen, Bull. Amer. Mus. Nat. Hist. *10*:267, 1898. Type locality, Ducks, British Columbia.

Distinctions.—Differs from *richardsoni* in shorter tail, more olivaceous dorsal colour in summer and reduced amount of black on the tail, one-third or less of tail length black instead of one-half black.

Measurements.—Average of twenty-five adults: Total length 324 mm. (282–355); tail 126 mm. (110–144); hind foot 51 mm. (49–54).

Distribution.—The south central part of the Province from Ashcroft, Kamloops, and Revelstoke south to Washington and Idaho. East to Rossland and west to Mile 23 on the Hope–Princeton Highway. Specimen records from Mount Todd, Ducks, Okanagan Falls, Okanagan Landing, Falkland, Shuswap, Kamloops, Black Pines, Pavilion, Lillooet, Bridge River, Mount Revelstoke, 30 miles north of Revelstoke, Monashee Pass, Keremeos, Princeton, Fairview Summit, Penticton, Anarchist Mountain, Midway, Glacier. Specimens from Rossland and Trail are intergrades toward *richardsoni*.

Douglas Squirrel—Chickaree

Tamiasciurus douglasi mollipilosus (Audubon and Bachman)

Audubon and Bachman, Proc. Acad. Nat. Sci. Phila. *1*:102, 1841. Type locality, coast of northern California.

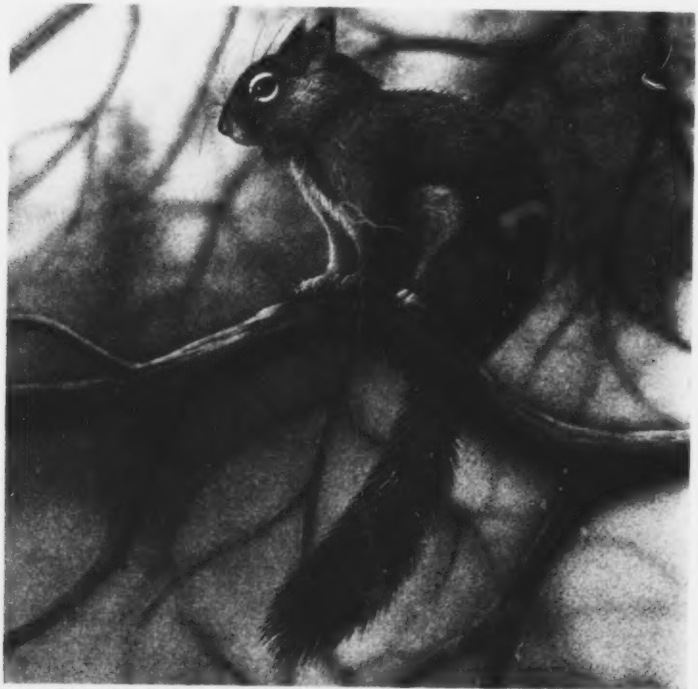


Plate 26. Douglas Squirrel or Chickaree, *Tamiasciurus douglasi*.

Description.—Dorsal region dull olive brown, undersurface buff in summer, pale buff and with a grey mixture in winter. Black lines along the side separate the dorsal and ventral colours; these lines are less obvious during the winter. Tail dark above and somewhat mixed with buff below, hairs tipped with yellow or white. Ears tufted in winter pelage.

Measurements.—Average and extremes of twenty-three adult specimens: Total length 304 mm. (290–318); tail 121 mm. (113–136); hind foot 48 mm. (41–55).

Habitat.—The edges of dense forests, most commonly in open conifer or mixed forests of the Coast Forest Biotic region. Ranges into and often lives in regenerating cut-over forests.

Biology.—The food consists of seeds, berries, fruits, and mushrooms, especially seeds of Douglas fir, pine, grand fir, broad-leafed and vine maples, alder catkins, red and blue huckleberries, filbert nuts. Nests are usually in cavities of dead trees and are made largely of fine strands of cedar bark and of moss. Outside nests built in the tops of coniferous trees are less common. Sometimes use is made of abandoned birds' nests, altered to suit. There may be early and late summer litters, but one litter is more usual. Litter size averages four.

Distribution.—The coastal slope of the Cascade and Coast Ranges from the southern boundary north to Owikeno Lake at head of Rivers Inlet. East in the south to 1 mile east of Pinewoods on the Hope–Princeton Highway. Localities represented are Vancouver, Huntingdon, Mile 23 on Hope–Princeton Highway, Pinewoods (Manning Park), Alexandra Lodge, Spuzzum, Bowen Island, Gambier Island, Alta Lake, Stuart Island, Powell River, Bute Inlet, Kingcome Inlet, Loughborough Inlet, south side of Owikeno Lake (*see* Map 21).

Remarks.—There is a difference of opinion as to the subspecific identification of certain populations of this squirrel. Those inhabiting the mountains are paler and have the tail hairs tipped with white. The specimens from the coast, however, are darker and with yellow-tipped tail hairs. These characteristics are those ascribed to *mollipilosus* and *douglasi* respectively, but currently only the former is regarded as entering the Province.

GENUS GLAUCOMYS—FLYING SQUIRRELS

Northern Flying Squirrel

Glaucomys sabrinus (Shaw)

Description.—The flying squirrel is one of the most distinctive of all the smaller mammals. The outstanding feature of its structure is the loosely fitting skin that is extended in a broad fold from each side between the foreleg at the wrist and the hind leg at the ankle. This and the entire body are covered in soft, dense fur. The eyes are large and black; the tail broad and flat. Dorsal colour varies from pale pinkish-brown through grey-brown to rich reddish-brown. Underparts are either white or more or less tinged with yellow or brown. The soles of the feet are furred. Most of the western subspecies have both a red and a grey colour phase, but the incidence of these varies greatly from one subspecies to the

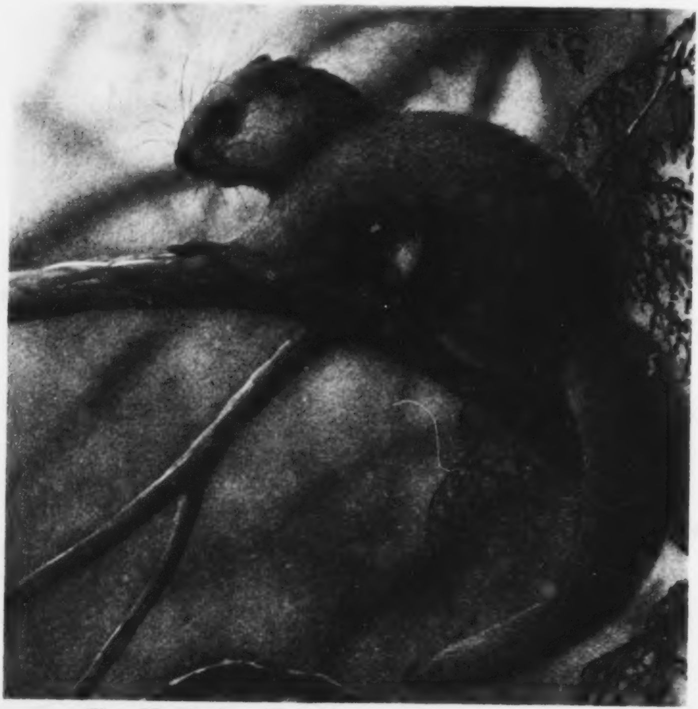


Plate 27. Northern Flying Squirrel, *Glaucomys sabrinus*.

next. The separation of many of the subspecies depends upon such subtle differences in colour that written descriptions are of little assistance without comparable specimens in hand.

Habitat.—Occurs in almost any forested habitat where some of the trees are at least 50 feet or more in height. Prefers an open type of forest.

Biology.—Nests are made either in tree cavities or among the branches of a tree, and may be within 3 feet of the ground. Occasionally an old bird's nest is adapted. Tree nests are composed of sticks, mosses, lichen, and soft plant fibres. Cavity nests are often lined almost exclusively with *Usnea* or related arboreal lichens. Young average three, and there is probably one litter per annum, born in May, but we have one very small young one (232 mm.) taken in October. The flying squirrel is almost exclusively nocturnal. It becomes torpid during periods of severe winter weather and is known to store food for winter use. However, it does not make large stores after the manner of the red squirrel. Food consists of leaves, buds, fruits, and seeds of trees, shrubs, and some herbaceous plants. Insects, birds, and eggs are eaten when they become available.

SUBSPECIES

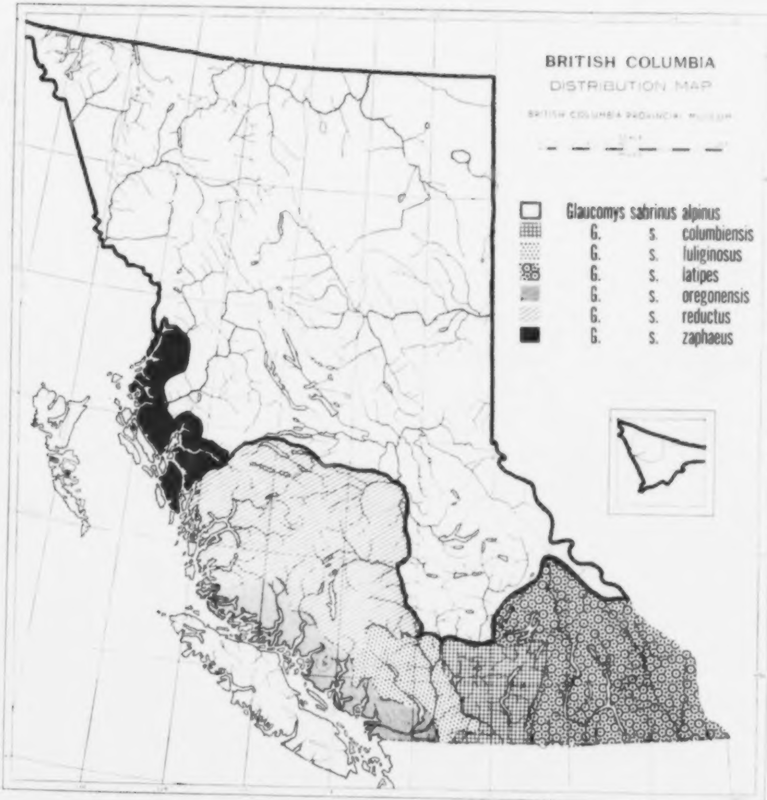
Glaucomys sabrinus alpinus (Richardson)

Richardson, Zool. Journ. *3*:519, 1828. Type locality, Jasper House, Alberta.

Distinctions.—Colour greyish-brown or drab, sides of face grey; underparts soiled whitish to pale smoky buff; tail, upper parts of flying membranes, eye-ring and ear-tips sooty or blackish-brown. Skull short and with relatively broad brain case.

Measurements.—Five specimens, means and extremes: Total length 323 mm. (292–343); tail 142 mm. (123–155); hind foot 41 mm. (38–45).

Distribution.—Northern and eastern areas from Atlin in the far north-west, east of Liard Crossing, south to the vicinity of Yellowhead Pass at least, and west to Salvus on the Lower Skeena River. Specimen records are from Atlin, Lower Liard Crossing, Indianpoint Lake, Tetana Lake, Stuart Lake, Salvus, Hudson Hope,


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Glaucomys sabrinus alpinus
G. s. columbiensis
G. s. fuliginosus
G. s. latipes
G. s. oregonensis
G. s. reductus
G. s. zaphaeus

Map 22. Distribution of the Flying Squirrel, *Glaucomys sabrinus.*

Tupper Creek, Little Prairie, Babine Lake, Nulki Lake, Henry Creek in Wells Gray Park.

Glaucomys sabrinus columbiensis Howell

Howell, Proc. Biol. Soc. Wash. *28*:111, 1915. Type locality, Okanagan, British Columbia.

Distinctions.—A brightly coloured race with the dorsal areas vinaceous cinnamon, underparts white or nearly white, often washed with yellow; sides of face grey.

Measurements.—Average and extremes of nine adults: Total length 332 mm. (317–355); tail 150 mm. (144–166); hind foot 42 mm. (36–45).

Distribution.—Confined to the Okanagan, Nicola, and Similkameen Valleys. Howell (1918:46) confused this race with the red phase of *latipes* and with intergrades between *oregonensis* and *fuliginosus,* and thus gave it a geographically meaningless distribution. Specimen records: Eastern Manning Park, Hedley, Falkland (Grand Prairie), Salmon River, Okanagan Landing, Vernon, Schoonover Mountain east of Okanagan Falls, Penticton, Lumby, Okanagan Falls, Canyon Creek in Kettle Valley, Bridesville.

Glaucomys sabrinus fuliginosus (Rhoads)

Rhoads, Proc. Acad. Nat. Sci. Phila. *49*:321, 1897. Type locality, Martin Station, Cascade Mountains, Kittitas County, Washington.

Distinctions.—Large size and generally greyish-brown dorsal surface and dirty white underparts distinguish this race from *oregonensis.* It is larger and greyer also than *columbiensis* and lacks the yellow wash on the underparts found in a large proportion of the latter.

Measurements. — Average and extremes of nineteen adults: Total length 334 mm. (317–380); tail 150 mm. (125–162); hind foot 43 mm. (38–46).

Distribution.—Inhabits the mountains, chiefly, if not entirely, on the west slope of the Cascade and Coast Ranges north at least to Seton Lake and south into Washington. The eastern limits are not known. Specimen records from Mount Sproatt, Alta Lake, Cheakamus Lake, North Vancouver (intergrade with *oregonensis*), Hope, Manning Park, Blackwater Lake (near Lillooet), Seton Lake, Lillooet. We do not support Anderson's (1946) contention that this race extends eastward to the Rocky Mountains.

Glaucomys sabrinus latipes Howell

Howell, Proc. Biol. Soc. Wash. *28*:112, 1915. Type locality, Glacier, British Columbia.

Distinctions.—Similar to *fuliginosus* but upper parts more reddish, and underparts distinctly paler, throat and chest predominantly white, abdomen slightly smoky or washed with cinnamon. All the western flying squirrels have a tendency to dichromatism, but this is more frequent in this race than in most. The red phase probably gave rise to the supposed race *G.s. bullatus* (Howell, 1915). Specimens in juvenile pelage are much paler dorsally and ventrally than in *fuliginosus,* with a distinctively darker under tail. Upper side of tail with black line down centre seldom present in *fuliginosus.*

Measurements.—Eleven adults: Total length 334 mm. (310–353); tail 152 mm. (138–165); hind foot 44 mm. (41–46). Skull with high cranium and zygomata broad posteriorly and tapering abruptly forward.

Distribution.—In the mountains across the southern part of the Province east of the Okanagan Valley and south of the latitude of Shuswap and Glacier. Specimens from Mount Revelstoke, Akolkolex River, Glacier, Shuswap, Cranbrook, Newgate, Yahk, Morrissey, Rossland, Westbridge, Paradise Mine, Tornado Pass, Field (intergrade with *alpinus*).

Glaucomys sabrinus oregonensis (Bachman)

Bachman, Journ. Acad. Nat. Sci. Phila. *8*:101, 1839. Type locality, probably near St. Helen, Columbia County, Oregon.

Distinctions.—The most richly coloured of the subspecies; upper parts rich reddish-brown, underparts buff or greyish-buff; sides of face brownish-grey. The smallest of the western flying squirrels.

Measurements.—Eight females measured: Total length 310 mm. (295–335); tail 142 mm. (131–152); hind foot 41 mm.

(36–42). Three males: 285 mm. (264–302); 129 mm. (128–130); 40 mm. (37–42).

Distribution.—Confined to the lowlands west of the Cascade and Coast Ranges in the extreme south-western corner of the Province. Specimen records from Loughborough Inlet, Bute Inlet, Halfmoon Bay, Aldergrove, Huntingdon, Dollarton, Vedder River, Vancouver, North Vancouver, Agassiz, Chilliwack, Harrison, Mission, Stave Lake, Upper Skagit River. This race intergrades with *fuliginosus* on the western slopes of the mountains but, contrary to the statement by Howell (1918), nowhere meets *columbiensis.*

Glaucomys sabrinus reductus Cowan

Cowan, Proc. Biol. Soc. Wash. *50*:79, 1937. Type locality, Lonesome Lake on Atnarko River, British Columbia.

Distinctions.—Differing from *alpinus* in paler body colour, ventral coloration white rather than grey washed with brown, sides of face clear grey instead of sooty or brownish grey, tail greyish rather than reddish. Skull shorter and relatively broader, with foreshortened rostral region. From *zaphæus, reductus* differs in being paler, less reddish, dorsally, and much paler ventrally; skull differs in having ratio of tooth row to diastema 85 per cent as against 91 per cent in *zaphæus.*

Measurements.—Mean and extreme measurements of six individuals: Total length 315 mm. (304–323); tail 137 mm. (120–151); hind foot 41 mm. (39–44). For comparative skull measurements of the British Columbia subspecies of *glaucomys, see* Proc. Biol. Soc. Wash. *50*:82.

Distribution.—Lonesome Lake, Anahim, Chezacut, Quesnel (intergrade with *alpinus*), Ootsa Lake, Wistaria, Ormidale Harbour, Stuie, Hagensborg, Kimsquit, Nusatsum, Koeye River.

Glaucomys sabrinus zaphæus (Osgood)

Osgood, Proc. Biol. Soc. Wash. *18*:133, 1905. Type locality, Helm Bay, Cleveland Peninsula, Alaska.

Distinctions.—Closely similar to *alpinus* but darker; certain features of skull form are distinctive.

Measurements. — Six topotypes measured (Howell, 1918): Total length 307 mm. (292–311); tail 144 mm. (133–152); hind foot 40.7 mm. (39–42).

Distribution.—Confined to the northern coast, southern limits of its range unknown. Specimen records: Nass River, Princess Royal Island.

FAMILY GEOMYIDÆ—POCKET GOPHERS

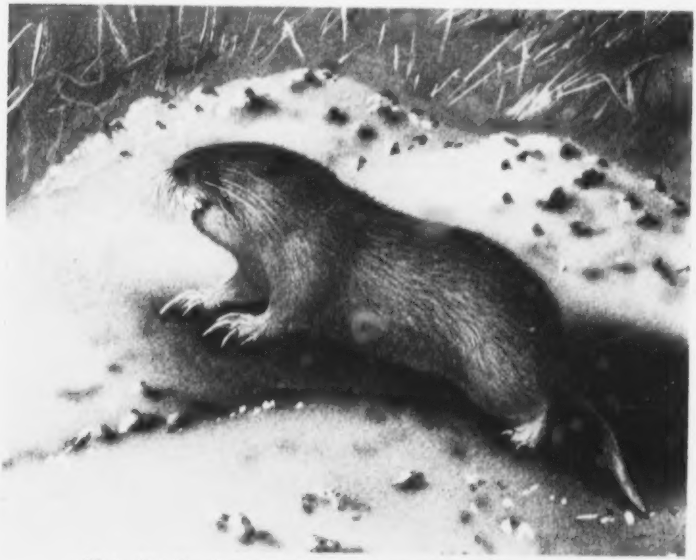


Plate 28. Northern Pocket Gopher, *Thomomys talpoides*.

Northern Pocket Gopher

Thomomys talpoides (Richardson)

Description.—About the size of a rat, tail about half length of body, slender, scantily haired. Head broad; eyes small; ears short, hardly projecting above fur; large fur-lined pouch extending back inside the cheek from an opening on each side of the mouth.

Foreclaws strongly curved and sharp-pointed. Colour brownish-grey, lighter beneath, usually some white on throat, chin or chest.

Habitat.—The pocket gopher lives underground in long burrow systems; the excavated earth is thrown out in small mounds. In British Columbia it avoids the arid areas and soils with a dense brush or forest-cover. Where suitable soils occur, it ranges from valley-bottom to the alpine meadows.

Biology.—Food consists of the roots and leaves of a wide variety of grasses and flowering plants, usually obtained without coming to the surface. Bulbs and roots are sometimes stored in underground chambers. One litter of young is born in April and May, and numbers from three to eight; the gestation period is approximately twenty-eight days.

SUBSPECIES

For a detailed revision, *see* Johnstone, Cana. Field-Nat. *68* (4): 155, 1954.

Thomomys talpoides cognatus Johnstone

Johnstone, Canad. Field-Nat. *68*:155, 1954. Type locality, Crowsnest Pass, British Columbia.

Distinctions.—From *saturatus,* the only subspecies with adjacent range, by smaller size, shorter tail (average 45 per cent of body length), paler colour, tail pale throughout its length; white markings on abdomen frequent.

Measurements. — Eleven topotypes measured: Total length 187 mm. (175–197); tail 57 mm. (55–64); hind foot 26.3 mm. (25–27).

Distribution.—Eastern side of the Rocky Mountain trench east of the Kootenay River from the 49th parallel north and east to Crowsnest Pass, west to the Kootenay River at Newgate, north across the Elk River but not as far as Bull River. Specimens available from Crowsnest Pass, Baynes Lake, East Newgate.

Thomomys talpoides fuscus Merriam

Merriam, North Amer. Fauna *5*:70, 1891. Type locality, mountains at head of Big Lost River, Custer County, Idaho.

Distinctions.—Largely based upon cranial features, but differs also in darker, more reddish-brown body coloration.

Measurements.—Twenty-one adults of both sexes from Rossland measured: Total length 192 mm. (175–205); tail 61.5 mm. (56–67); hind foot 25.6 mm. (25–27).

Distribution.—The Monashee Mountains from the 49th parallel north to the junction of Burrel Creek and Granby River, east to the Columbia River. Specimens from Rossland, Sheep Creek, Eholt, Cascade, Anarchist Mountain, Midway, Greenwood.

Thomomys talpoides incensus Goldman

Goldman, Journ. of Mammal. *20*:244, 1939. Type locality, Shuswap, British Columbia.

Distinctions.—Differs from *fuscus* in a number of features of skull form and in having body colour duller and less reddish-brown. Certain populations in the Nicola Valley have a red phase, but this is paler and more rusty than *fuscus.*

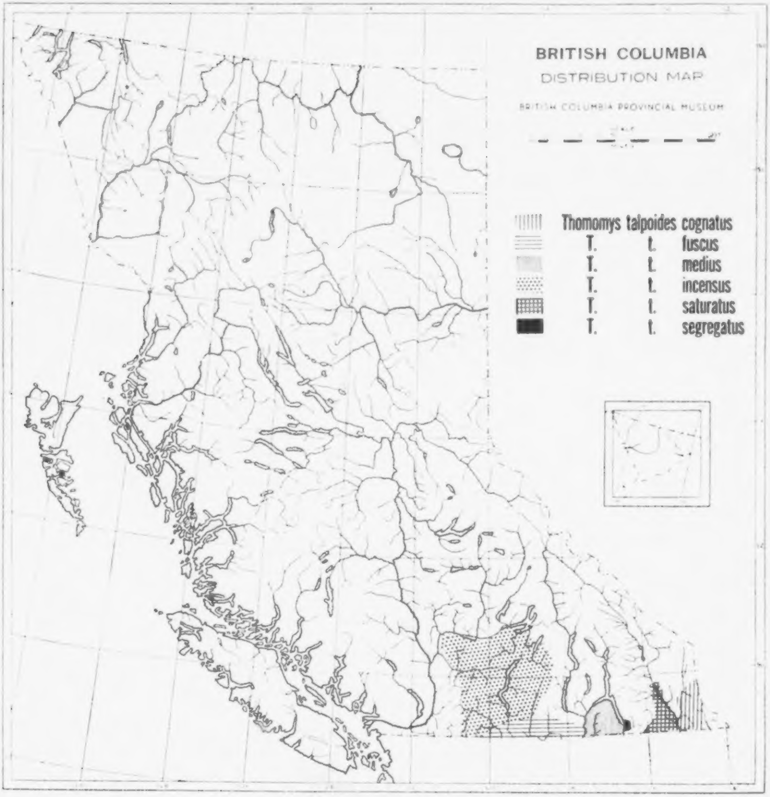
Measurements.—Nineteen adults of both sexes from Manning Park measured: Total length 204 mm. (184–277); tail 71 mm. (56–82); hind foot 26 mm. (24–27).

Distribution.—From Keremeos and Skaha Lake north to the Thompson and South Thompson River valleys, east to the Monashee Range on the head of the Kettle River, and west to Manning Park. Specimens from Ashcroft, Savona, Tunkwa Lake, Kamloops, Monte Creek, Shuswap, Falkland, Grindrod, Salmon Arm, Stump Lake, Boleau Lake, O'Keefe, Three Brothers Mountain in Manning Park, Princeton, Keremeos, Enderby, Okanagan Landing, Summerland, Lavington, Monashee Pass.

Thomomys talpoides medius Goldman

Goldman, Journ. of Mammal. *20*:241, 1939. Type locality, summit of Toad Mountain, 6 miles south of Nelson, British Columbia.

Distinctions.—Similar in general to *fuscus* but darker in colour and with well-marked cranial characteristics. Tail length averages 51 per cent of body length.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Thomomys talpoides cognatus
T. t. fuscus
T. t. medius
T. t. incensus
T. t. saturatus
T. t. segregatus

Map 23. Distribution of the Pocket Gopher, *Thomomys talpoides*.

Measurements.—Fifteen adult males measured: Total length 195 mm. (183–210); tail 67 mm. (60–82); hind foot 25 mm. (24–27). Fourteen females measured respectively: 196 mm. (183–210); 67 mm. (61–76); 25 mm. (23–27).

Distribution.—East of the Columbia River, west and south of the north- and west-flowing Kootenay River and Kootenay Lake. Specimens from West Creston, Toad Mountain, Fruitvale, and Hull Creek.

Thomomys talpoides saturatus Bailey

Bailey, Proc. Biol. Soc. Wash. *27*:117, 1914. Type locality, near Saltese, Coeur d'Alene Mountains, Mineral County, Montana.

Distinctions.—Larger than *fuscus* and *cognatus,* with richer, darker coloration and less tendency to white markings below. Basal part of tail dark, terminal portion white. Tail length about as in *medius* and *fuscus.*

Measurements.—Ten adult males measured: Total length 212 mm. (196–223); tail 71 mm. (61–79); hind foot 28 mm. (27–29). Thirteen females measured respectively: 203 mm. (186–218); 65.5 mm. (58–73); 27 mm. (25–29).

Distribution.—North from the International Boundary along the Moyie River valley to Yahk, east to the Kootenay Valley at Newgate and Wardner. Specimens from West Newgate, Wardner, Turtle Lake, Cranbrook, Bull River, Fort Steele, Wasa, Yahk.

Thomomys talpoides segregatus Johnstone

Johnstone, Canad. Field-Nat. *68*:155, 1954. Type locality, Goat Mountain near Wynndel, British Columbia.

Distinctions.— Largely based upon skull characteristics, but colour is greyer and more neutral than in adjacent races, and the tail is proportionately longer than in any other subspecies, averaging 56 per cent of body length.

Measurements.—Twelve adult males measured: Total length 208 mm. (193–220); tail 74 mm. (64–81); hind foot 27 mm. (24–29). Fifteen females measured respectively: 199 mm. (190–210); 72 mm. (65–76); 26 mm. (23–29).

Distribution.—Known only from a small area near Wynndel and completely isolated from contact with adjacent subspecies.

FAMILY HETEROMYIDÆ—POCKET MICE AND KANGAROO RATS

GENUS PEROGNATHUS—POCKET MICE

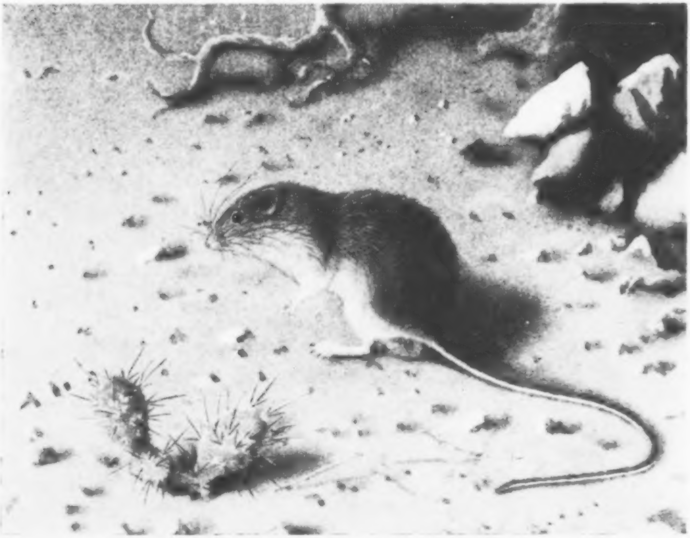


Plate 29. Great Basin Pocket Mouse, *Perognathus parvus.*

Great Basin Pocket Mouse

Perognathus parvus (Peale)

Description.—About the size of a white-footed mouse, ears small and clothed with short fur, long tail covered with short hairs, grey above and white below. Upper parts greyish-buff, more or less speckled or washed with black. Underparts pure white to the bases of all hairs. An easily visible, external, fur-lined pocket on either side of the mouth.

Habitat.—The arid areas where sagebrush and grasses in association are the dominant vegetation.

Biology.—These are noctural mice, spending the day in burrows excavated in the sandy soil at the base of some small shrub.

Food consists of a wide variety of plant material, green leaves and tips, seeds of grasses and other plants, and occasionally insects. They are capable of existing without access to water. There is usually just one litter of young per year, but some small young taken in August indicate an occasional second litter. Young number four to eight.

SUBSPECIES

Perognathus parvus laingi Anderson

Anderson, Nat. Mus. Canada, Ann. Rept. 1931:100, 1932. Type locality, Anarchist Mountain near Bridesville, British Columbia.

Distinctions.—Differs from *P.p. lordi* in smaller size, and colour sandy or greyish-buff, usually heavily overlaid with black, giving a darker general appearance.

Measurements. — Eight adult males measured: Total length 174 mm. (166–180); tail 90 mm. (84–101); hind foot 22.5 mm. (22–23). Five females measured: Total length 166 mm. (156–174); tail 88 mm. (84–91); hind foot 22 mm. (21–23).

Habitat.—Less arid plant communities than *lordi.* Ascends Anarchist Mountain to 3,000 feet, where it occurs in wasteland adjacent to cultivated fields. On the commonage at Vernon it occupies a similar habitat.

Distribution.—Specimens are known from near Bridesville, on Anarchist Mountain, the commonage between Vernon and Okanagan Landing, and Ashcroft.

Perognathus parvus lordi (Gray)

Gray, Proc. Zool. Soc. London (Pt. 1):202, 1868. Type locality, in southern British Columbia has been presumed to be Osoyoos.

Distinctions.— From *laingi,* the other race occurring in the Province, *lordi* differs in larger size and paler, greyer coloration, as well as in skull characters.

Measurements.—Seven adult males averaged: Total length 187 mm. (173–202); tail 101 mm. (91–112); hind foot 24 mm. (23–25). Six adult females averaged: Total length 175 mm. (166–183); tail 92 mm. (86–100); hind foot 23 mm. (21–24).

Habitat.—This subspecies is confined to the arid bottom of the Okanagan and Similkameen Valleys.

Distribution.—Known from Osoyoos, Oliver, Keremeos, and Midway.

FAMILY CASTORIDÆ—BEAVERS

GENUS CASTOR—RECENT BEAVERS

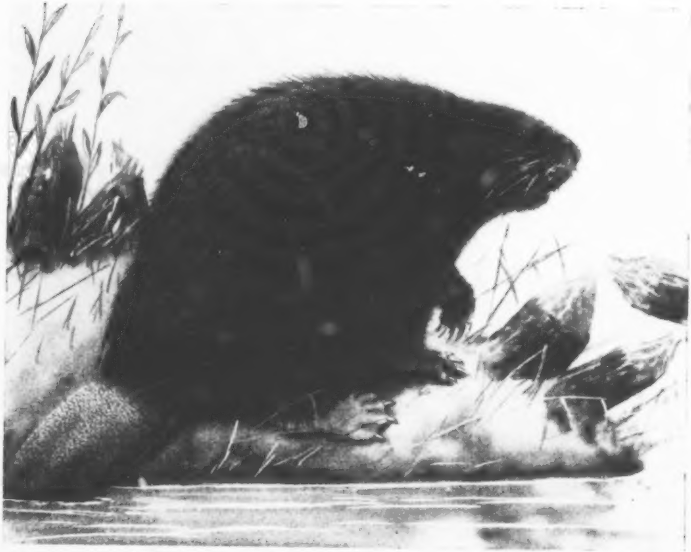


Plate 30. American Beaver, *Castor canadensis.*

American Beaver

Castor canadensis Kuhl

Description.—Large aquatic rodents, fur dark reddish-brown and consisting of coarse reddish-brown guard hairs over a dense coat of soft, dark-brown underfur. Eyes and ears small; tail horizontally flattened, paddle-shaped and scaly, hind feet large, naked, webbed.

Habitat.—The vicinity of fresh-water bodies in forested country. Streams and lakes of all sizes are equally favoured, but swift-flowing streams subject to flash flooding are unsuitable for permanent colonization by beavers. The animal enters salt water and has reached most of the suitable islands, large and small, along the coast.

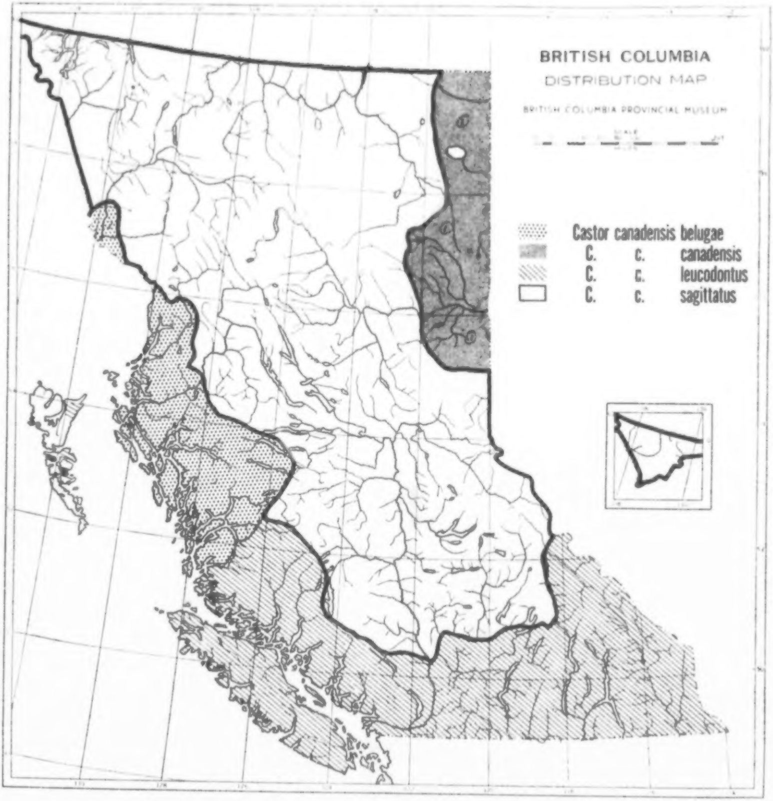
Biology.—The beaver is well known for the changes it makes in the environment while establishing a colony. Houses or lodges, 4 feet or more in height above high-water line, may be 12 feet or more across at the base. They are constructed of sticks, logs, debris, and mud and are added to at irregular intervals over the years. The nest chamber, gnawed out of the heart of the mound of logs and sticks, is situated just above the high-water mark and provided with a bedding of chipped and shredded wood, particularly when the young are small. Sometimes no lodge is constructed, and the beavers occupy burrows in the bank of lake or stream. Water-levels are often controlled by the construction of dams; canals are dug from the main pond toward chosen feeding areas.

Food is most variable—the leaves and bark of aspen, willows, and poplar, roots and stems of yellow pond lily, pond weeds, cattail, and some sedges are favoured. The coastal races consume quantities of alder and bracken, and most races make some use of conifers. Lodgepole pine, Englemann spruce, western hemlock, and alpine fir are all used, along with a wide variety of other trees, shrubs, herbs, and grasses.

In September and October most colonies cut and store the winter food-supply. This usually consists of short segments of palatable trees embedded in the bottom of the pond near the lodge.

Mating takes place usually in January or February but may occur as late as April. The young are born from late April to early July after a gestation believed to be about ninety days. We have examined pregnant females and very young kits as late as June 24th.

The colony occupying a lodge usually consists of a pair with the young of the year and of the preceding year. The 2-year-olds leave the colony in midsummer and pair up to found new lodges.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Castor canadensis belugae
C. c. canadensis
C. c. leucodontus
C. c. sagittatus

Map 24. Distribution of the Beaver, *Castor canadensis*.

During this period they travel widely and may be found a long distance from water.

Although all the large carnivores prey upon beaver, their most serious enemy is disease. Tularæmia is currently believed to be the most important of several known bacterial diseases.

SUBSPECIES

Castor canadensis belugæ Taylor

Taylor, Univ. Calif. Publ. Zool. *12*:429, 1916. Type locality, Beluga River, Cook Inlet region, Alaska.

Distinctions.—Separation of this race from the others is based almost exclusively on skull characteristics.

Measurements.—None available.

Distribution.—Lower Stikine River (approaching *sagittatus*), Terrace, Anahim Lake (approaching *sagittatus*), west branch of Homathko River, Stuie, Wistaria. This is probably the subspecies occurring on the many islands adjacent to the northern coast; viz., Porcher, Pitt, Banks, McCauley, Campania, Princess Royal, Aristazabal, Swindle, Campbell, Hunter, and Calvert Islands (McCabe and Cowan, 1945).

Castor canadensis canadensis Kuhl

Kuhl, Beiträge z. Zoologie 1820:64. Type locality, Hudson Bay.

Distinctions.—Differs from the other races in larger adult size; tail proportionately longer and narrower; and mainly in characteristics of the skull.

Measurements.—Four specimens from the Rocky Mountain area measured: Total length 1,097 mm. (44 inches) (985–1250); tail 349 mm. (14 inches) (295–380); hind foot 186 mm. (3½ inches) (170–202). Weights of adults (i.e., over 3 years) range upward from 30 to 100 pounds. A male and female from Jasper, Alberta, weighed 68 and 75 pounds respectively.

Distribution.—The distribution of this subspecies of beaver in British Columbia is imperfectly known. Specimens from East Pine and Little Prairie in the Peace River District.

Castor canadensis leucodontus Gray

Gray, Ann. Mag. Nat. Hist., Series 4, *4*:293, 1869. Type locality, Vancouver Island, British Columbia.

Distinctions.—Described as having the enamel of the incisors paler than in other races, but this is not a uniform characteristic. Tail relatively broader than in *canadensis* and *sagittatus*, about as in *belugæ;* distinctions are largely in cranial features.

Measurements.—Means and extremes of seven specimens from Courtenay, Vancouver Island: Total length 886 mm. (36 inches) (850–925); tail 236 mm. (9½ inches) (225–260); hind foot 107 mm. (4¼ inches) (95–125). Mean weight of four specimens 18 pounds (17–19½).

Distribution.—Throughout Vancouver Island and the southern mainland, introduced on to Queen Charlotte Islands in 1950 and established near Tlell. Specimens from Beaver Creek near Alberni, Quatsino, Little Oyster River, Mohun Lake, and Courtenay. On the mainland from Chilliwack, Manning Park, Okanagan Landing, Kettle Valley, Fort Steele (approaching *sagittatus*), Golden, Bush River.

Castor canadensis sagittatus Benson

Benson, Journ. Mammal. *14*:320, 1933. Type locality, Indianpoint Creek, British Columbia.

Distinctions.—A dark-coloured beaver, similar externally to *canadensis* but differing markedly in having a short, broad, flattened skull with broadly based tapering rostrum.

Measurements.—One 2-year-old measured: Total length 730 mm.; tail 260 mm.; hind foot 135 mm.

Distribution.—The interior of the Province from Fort Halkett (Baker, 1951) and Lower Liard Crossing in the north, south to the Thompson and South Thompson River drainage. Specimen records from Fort Halkett, Lower Liard Crossing, Fort Grahame, Wistaria, Tetana Lake, Driftwood River, Manson, Sinkut Lake near Vanderhoof, Miocene, Meldrum Creek, Chezacut, Horsefly, Indianpoint Lake and vicinity, Barkerville, Cottonwood, Ahbau Lake, Murtle River, North Fork of Eagle River.

FAMILY CRICETIDÆ—NEW WORLD RATS AND MICE

GENUS REITHRODONTOMYS—AMERICAN HARVEST MICE

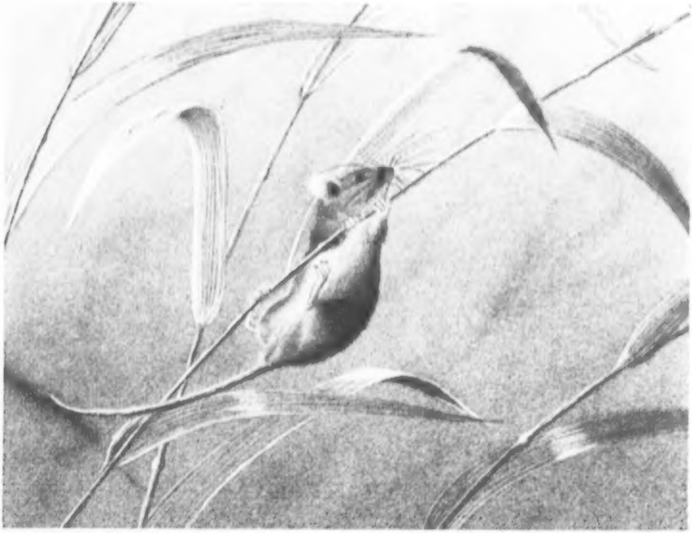


Plate 31. Western Harvest Mouse, *Reithrodontomys megalotis*.

Western Harvest Mouse

Reithrodontomys megalotis megalotis (Baird)

Baird, Mammals, in Rep. Expl. Surv. Railr. to Pacific, *8* (Pt. 1):451, 1858. Type locality, between Janes, Chihuahua, Mexico, and San Luis Springs, Grant County, New Mexico.

Description.—This is the smallest mouse inhabiting the Province. It is about 5½ inches long when full grown and of this one-half is tail. Colour is brownish-buff dorsally, with usually a faint mid-dorsal dark stripe, underparts whitish. Ears prominent and almost naked, tail slender and sparsely haired, dark above and light below.

Measurements.—Sixteen specimens from Osoyoos measured: Total length 128 mm. (110–137); tail 60 mm. (50–65); hind foot 17.5 mm. (17–18).

Distinctions.—Likely to be confused only with the house mouse, from which it can be distinguished by more buff dorsal colour, more prominent and less-furred ears, white underparts, and unequivocally by having a shallow but distinct groove down the outer surface of each upper incisor.

Habitat.—Occurs in the dense vegetation bordering lakes, streams, and irrigation-ditches; in rose thickets and along the edges of cultivation; also found in wooded ravines traversing the sagebrush flats east of Osoyoos Lake.

Biology.—Subsists largely on seeds and on vegetation; sometimes makes small piles of plant stem cuttings as does *Microtus*. The breeding season begins in March. The young number from two to six per litter, probably four litters per year. Nests are on the ground under shelter and are either ball-like or cup-shaped and made of dry vegetation.

Distribution.—Confined to the floor of the Okanagan Valley north as far as Penticton. Specimen records from Osoyoos Lake and north end of Skaha Lake.

GENUS PEROMYSCUS—WHITE-FOOTED MICE

White-footed Mouse or Deer Mouse

Peromyscus maniculatus (Wagner)

Description.—Greatly variable in size and in colour but always (in adults) with dorsal surface some shade of brown, and the underparts white (except *rubriventer*); ears prominent and naked; tail slender, bicolour, white below (except *rubriventer*); feet white (except *rubriventer*). Young are some shade of grey above; underparts, feet, and undertail white or very pale grey.

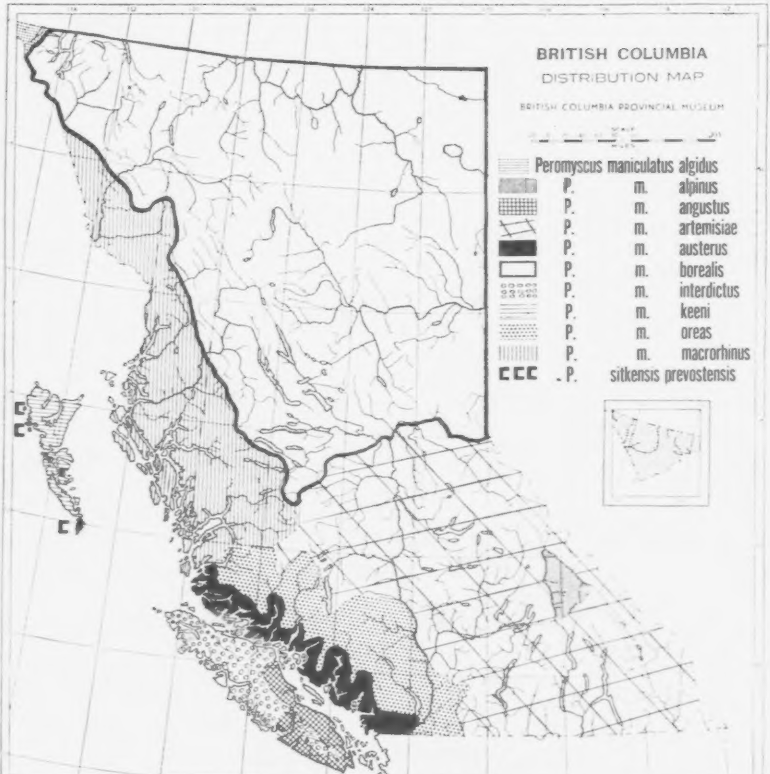
Habitat.—Extremely variable and may occur in almost any area habitable by terrestrial mammals. The habitat selection of some subspecies is, however, quite precise. It frequently enters human habitation.

Biology.—This mouse is almost omnivorous, feeding on a wide variety of plant and animal foods such as conifer seeds, fruits of berry-bearing plants, seeds and succulent stems of grasses, insects, flesh, and small shore animals such as crabs and limpets. There are from two to four or more litters per year, depending upon habitat and subspecies. Young per litter vary from two to eight with a mean of 4.5 and a mode of 4. Nests are usually cup-shaped and constructed of fine plant material. They may be placed in almost any sheltered situation, usually in tree cavities, abandoned birds' nests, or on the ground under the protection of logs or brush-piles.

Plate 32. White-footed Mouse or Deer Mouse, *Peromyscus maniculatus.*

SUBSPECIES

This mammal is perhaps the most plastic of all North American species and has given rise to many subspecies with very easily appreciated external and internal differences. Most of the islands along the coast of the Province are inhabited by the species, and the isolation so achieved has fostered the development of new forms. Several of these have already been described and named, but it is known that undescribed forms remain.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Peromyscus maniculatus algidus
P. m. alpinus
P. m. angustus
P. m. artemisiae
P. m. austerus
P. m. borealis
P. m. interdictus
P. m. keeni
P. m. oreas
P. m. macrorhinus
P. sitkensis prevostensis

Map 25. Distribution of the White-footed Mouse, *Peromyscus maniculatus,* on the mainland and some adjacent islands, and of the Sitka Mouse, *Peromyscus sitkensis,* on the Queen Charlotte Islands (*see* Map 26 for other insular distribution).

Peromyscus maniculatus algidus Osgood

Osgood, North Amer. Fauna *28*:56, 1909. Type locality, head of Bennett Lake, British Columbia.

Distinctions.—Similar to *oreas* and *borealis* but somewhat paler and more greyish. Tail shorter than *oreas,* about as in *borealis.*

Measurements.—Average of twenty adult topotypes (Osgood, 1909): Total length 192 mm. (178–204); tail vertebræ 94 mm. (83–101); hind foot 22.5 mm. (22–23.5).

Distribution.—Stonehouse Creek, 5½ miles west from junction with Kelsall River (Baker, 1951), Bennett.

Peromyscus maniculatus alpinus Cowan

Cowan, Proc. Biol. Soc. Wash. *50*:215, 1937. Type locality, Mount Revelstoke, British Columbia.

Distinctions.—Large size, dark-brown dorsal coloration, tail longer than combined head and body.

Measurements.—Ten adults averaged: Total length 185 mm. (168–196); tail 96 mm. (86–106); hind foot 21 mm. (20–22).

Distribution. — Altitudes above 4,000± feet in the Selkirk Mountain Range near Revelstoke, British Columbia. Locality records: Revelstoke Mountain, Glacier, Kinbasket Lake.

Peromyscus maniculatus angustus Hall

Hall, Univ. Calif. Publ. Zool. *28*:422, 1932. Type locality, Beaver Creek, Alberni, British Columbia.

Distinctions. — Like *P.m. austerus* but brownish instead of blackish dorsally and with shorter brain case and longer anterior portion of the skull. Tympanic bullæ larger.

Measurements.—Means and extremes of twenty adults from selected localities: Total length 165 mm. (153–182); tail 80 mm. (69–90); hind foot 20 mm. (17–22).

Distribution.—At lower elevations on Vancouver Island where the characteristics are best exemplified on the coast from Victoria to Comox on the eastern side and north to Ucluelet on the west. Selected localities: Campbell River, Comox, Hornby Island, Ucluelet, Parksville, Nanaimo, Newcastle Island, Sidney Island, Bare Island, Saltspring Island, Victoria.

Peromyscus maniculatus artemisiæ (Rhoads)

Rhoads, Proc. Acad. Nat. Sci. Phila. *46*:260, 1894. Type locality, Ashcroft, British Columbia.

Distinctions.—Paler than the races adjoining it, and in adult pelage with a pinkish cast to the back and sides, tail shorter than head and body. Skull with nasals longer and more slender than in *oreas* or *borealis.*

Measurements.—Thirty adults: Total length 178 mm. (167–195); tail 81 mm. (68–94); hind foot 21 mm. (19–23).

Distribution.—The south central areas of the Province. Specimens have been examined from the following selected localities: Anahim Lake, Chezacut Lake, Bouchie Lake, Puntchezacut Lake, Indianpoint Lake, Quesnel, Lac la Hache, Canim Lake, Black Pines, Kamloops, Shuswap, Revelstoke, Glacier, Kootenay Park, Akamina Pass, Newgate, Cranbrook, Creston, Nelson, Rossland, Midway, Osoyoos, Princeton, Ashcroft, Lillooet, Lytton.

Peromyscus maniculatus austerus (Baird)

Baird, Proc. Acad. Nat. Sci. Phila. 7:336, 1855. Type locality, Old Fort Stielacoom, Pierce County, Washington.

Distinctions.—Small size, short tail, and very dark dorsal colour. The range is in contact only with that of *oreas,* and from it the present race can be differentiated by having tail shorter than head and body, and dorsal colour dark brown with tips of the guard hairs black, imparting a generally blackish appearance.

Measurements.—Twenty adults, means and extremes: Total length 176 mm. (160–193); tail 89 mm. (78–98); hind foot 21 mm. (20–23).

Distribution. — Along the sea-coast from the International Boundary to Kingcome Inlet. Does not extend up the mountain slopes more than 500± feet, where it is replaced by *oreas.* In the Fraser Valley between Vancouver and Cultus Lake it intergrades with *oreas.* At the northern end of its range the two races live together without interbreeding. Selected localities of occurrence are: Loughborough Inlet, Bute Inlet, Horseshoe Lake, Lund, Powell River, Gibsons Landing, Gambier Island, Vancouver, Indian River, Huntingdon, Agassiz.

Peromyscus maniculatus balaclavæ McCabe and Cowan

McCabe and Cowan, Trans. Roy. Can. Inst. 25:197, 1945. Type locality, Balaclava Island, British Columbia.

Distinctions.—The smallest of the races on the northern islands. Ratio of tail to body 92 per cent and hind foot short; otherwise like *interdictus* in external and cranial proportions. Differs from that race in being darker and with the sides more greyish.

Measurements. — Thirty-two adults measured: Total length 188 mm. (177–204); tail 90 mm. (82–101); hind foot 18 mm. (17–20).

Distribution.—Found only on Balaclava and Hope Islands of the Gordon group adjacent to northern Vancouver Island.

Peromyscus maniculatus beresfordi Guiguet

Guiguet, Ann. Rept. B.C. Prov. Mus. 1954:71, 1955. Type locality, Beresford Island, British Columbia.

Distinctions.— Smaller than *triangularis* and *sartinensis* but larger than *carli* from adjacent islands. More lightly coloured and more reddish than those races and with dorsal stripe more prominent; underparts whiter.

Measurements.—Twelve adults measured: Total length 225 mm. (223–237); tail 116 mm. (112–122); hind foot 26 mm. (25–27).

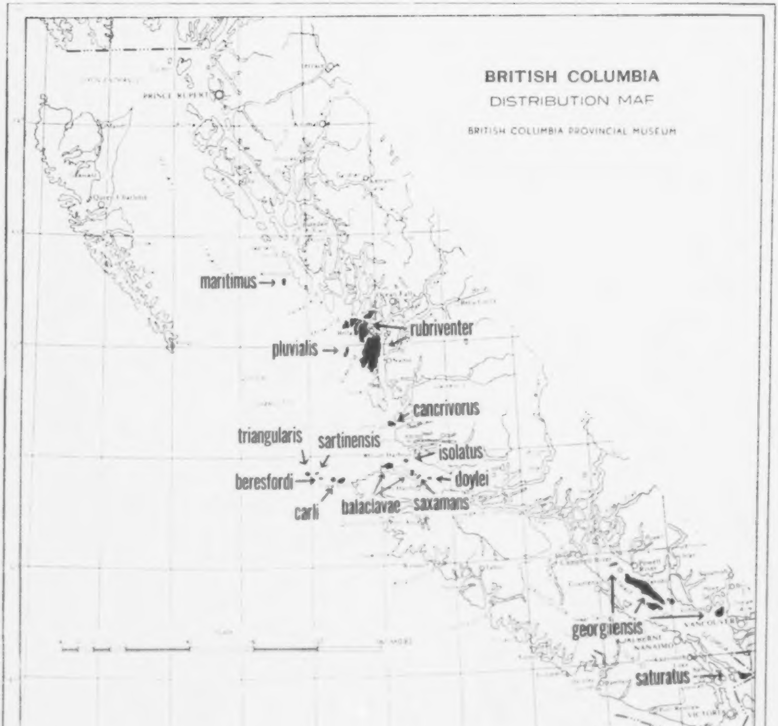
Distribution.—Confined to Beresford Island in the Scott Island group off the northern tip of Vancouver Island.

Peromyscus maniculatus borealis Mearns

Mearns, Bull. Amer. Mus. Nat. Hist. 2:285, 1890. Type locality, Fort Simpson, Northwest Territories.

Distinctions.—This is another of the short-tailed group. It differs from *artemisiæ,* with which it intergrades, in browner and yellower colour, shorter more angular skull. Tail is usually more strongly bicolour than in that race.

Measurements.—Means and extremes of eighteen adults from Jasper, Alberta, Takla Landing, and Pouce Coupe: Total length 171 mm. (143–183); tail 81 mm. (69–88); hind foot 21 mm. (20–22).


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
PRINCE RUPERT
maritimus
rubriventer
pluvialis
cancrivorus
triangularis
sartinensis
isolatus
beresfordi
doylei
carli
balaclavae
saxamans
georgiensis
VANCOUVER
ALBERNI
NANAIMO
saturatus
VICTORIA

Map 26. Distribution of known subspecies of the White-footed Mouse, *Peromyscus maniculatus*, on British Columbia coastal islands (supplementary to Map 25).

Distribution.—Found throughout the Province east of the Coast Ranges from the Skeena-Nechako Valleys northward. Selected localities of occurrence are: Nulki Lake, Sinkut Mountain, Nukko Lake, Hazelton, Kispiox, Glenora, Telegraph Creek, Steamboat Mountain, Summit Pass, McDonald Creek, Muncho Lake, Lower Liard Crossing, Irons Creek, Charlie Lake, Tupper Creek, Graham River, Richards Creek, Thompson Pass. The subspecies intergrades with *alpinus* between Kinbasket Lake and Mount Assiniboine, and with *artemisiæ* along its southern boundary.

Peromyscus maniculatus cancrivorus McCabe and Cowan

McCabe and Cowan, Trans. Roy. Canad. Inst. 25:195, 1945. Type locality, Table Island, British Columbia.

Distinctions.—Differs from *macrorhinus* of the adjacent mainland in being smaller, with shorter tail and hind foot and skull smaller in many parts. Pelage colour the palest of all north coast races, bright ochraceous over entire upper surface, dorsal stripe almost absent.

Measurements.—Nineteen adults measured: Total length 197 mm. (183–205); tail 103 mm. (96–110); hind foot 22 mm. (21–23).

Distribution.—Confined to Table Island.

Peromyscus maniculatus carli Guiguet

Guiguet, Ann. Rept. B.C. Prov. Mus. 1954:72, 1955. Type locality, Cox Island, British Columbia.

Distinctions.—Smaller than the other subspecies from the Scott Islands, with external measurements like those of *interdictus* from northern Vancouver Island. Dorsal stripe duller and not clearly defined. Sides duller and less reddish than in *beresfordi*. Skull long and relatively narrow with relatively large palatal slits.

Measurements.—Twenty-seven adults from Lanz Island measured: Total length 209 mm. (189–223); tail 105 mm. (94–113); hind foot 26 mm. (23–27).

Distribution.—Occurs on Lanz and Cox Islands of the Scott Island group off the north end of Vancouver Island.

Peromyscus maniculatus doylei McCabe and Cowan

McCabe and Cowan, Trans. Roy. Canad. Inst. *25*:197, 1945. Type locality, Doyle Island, British Columbia.

Distinctions.—Much larger than *interdictus* of adjacent Vancouver Island in both external and cranial dimensions. Similar to, but larger than, *macrorhinus* in body size and certain cranial features. Unique features are the prominent lambdoidal ridge and large posterior palatine foramina. Body colour distinctive in being brighter, more ochraceous, with more pronounced dorsal stripe, eye-ring, and whisker spots than the two races mentioned.

Measurements.—Fifteen adults measured: Total length 216 mm. (212–235); tail 111 mm. (102–123); hind foot 23 mm. (22–24).

Distribution.—Confined to Doyle Island, British Columbia.

Peromyscus maniculatus georgiensis Hall

Hall, Amer. Nat. *72*:453, 1938. Type locality, Vananda, Texada Island.

Distinctions.—Differs from *austerus* in having shorter tail and longer body, slightly longer hind foot; the skull is larger throughout except for interorbital breadth and some minor features. The colour is distinctly paler.

Measurements.—Six adult specimens from Texada Island measured: Total length 180 mm. (174–200); tail 79 mm. (74–93); hind foot 22 mm. (21–23).

Distribution.—Occurs on Savary, Texada, Lasqueti, Thormanby, and Bowen Islands in Georgia Strait.

Peromyscus maniculatus interdictus Anderson

Anderson, Ann. Rept. Nat. Mus. Canada 1931:110, 1932. Type locality, Forbidden Plateau near Comox, Vancouver Island, British Columbia.

Distinctions.—Like *oreas* but darker. Differs from *angustus*, the other subspecies on Vancouver Island, principally in much longer tail and darker colour.

Measurements.—Twenty-five adults from Port Hardy and Coal Harbour measured: Total length 196 mm. (182–215); tail 106 mm. (91–123); hind foot 23 mm. (22–24).

Distribution.—Vancouver Island except for the transition zone strip of the east coast from Victoria to Campbell River. This is the race of the west coast rain forest and of the high altitudes of the central and south-eastern parts of Vancouver Island. Specimens recorded from Cape Scott, Port Hardy, Shushartie, Sayward, Coal Harbour, Nootka, Forbidden Plateau, Mount Arrowsmith, Old Wolf Lake.

Peromyscus maniculatus isolatus Cowan

Cowan, Univ. Calif. Publ. Zool. *40*:134, 1935. Type locality, Pine Island, British Columbia, described as *Peromyscus sitkensis isolatus* but now believed to be a member of the *maniculatus* species.

Distinctions.—A large long-tailed race, of evenly dark dorsal coloration. Differs from *macrorhinus* in absence of greyish wash on the head and shoulders, larger ear, and several cranial peculiarities. From other adjacent subspecies the large size and the colour are distinctive.

Measurements.—Four specimens measured: Total length 224 mm. (220–230); tail 107 mm. (100–112); hind foot 25.5 mm. (25–26).

Distribution.—Confined to Pine Island, Queen Charlotte Sound.

Peromyscus maniculatus keeni (Rhoads)

Rhoads, Proc. Acad. Nat. Sci. Phila. *46*:258, 1895. Type locality, Masset, Graham Island, Queen Charlotte Islands, British Columbia.

Distinctions.—As its range brings it into close contact only with *Peromyscus sitkensis,* it need only be differentiated from that species. Size alone serves here, *keeni* having a total length less than 212 mm., *sitkensis* greater than that. The hind feet are smaller in *keeni,* 22.5 mm. as against 26.5 mm.

Measurements.—Thirty specimens from Graham Island had average and extreme measurements: Total length 198 mm. (181–212); tail 102 mm. (95–111); hind foot 22.5 mm. (22–23).

Distribution.—The Queen Charlotte Islands except Kunghit, Langara, Frederick, and Hippa Islands, and possibly some others among the isolated west coast islands. Localities represented: Cape Knox, Masset, Rose Spit, Meres Point, Tlell, McClinton Creek, Skidegate, Queen Charlotte City, Cumshewa Inlet, southern tip of Moresby Island, Sandspit.

Remarks.—There are significant differences in size between the mice inhabiting the east coast of Graham Island and those of the humid forests of the west coast and interior as represented by specimens from McClinton Creek. Eleven males from Tlell averaged: Total length 180 mm. (165–189); tail 97 mm. (89–103); hind foot 21 mm. (20–23); while eleven males from McClinton Creek averaged 198 mm. (189–206), 107 mm. 102–112), 23 mm. (22–24). There are corresponding differences in cranial measurements. These seem to reflect the same type of reaction to environmental selection for humidity or temperature that has led to the development of such recognized subspecies as *oreas* and *alpinus* on the mainland and *interdictus* as distinct from *angustus* on Vancouver Island.

Peromyscus maniculatus maritimus McCabe and Cowan

McCabe and Cowan, Trans. Roy. Canad. Inst. 25:199, 1945. Type locality, largest of the Moore Islands, British Columbia.

Distinctions.—Colour as in *macrorhinus* but tail shorter and body longer, ratio 91 per cent as against 114 per cent. Skull larger in many features.

Measurements.—Twenty-eight specimens: Total length 206 mm. (187–221); tail 100 mm. (89–110); hind foot 25 mm. (23–26).

Distribution.—Found only on the largest of the Moore Islands, (52° 38′ N. and 129° 28′ W.).

Peromyscus maniculatus macrorhinus (Rhoads)

Rhoads, Proc. Acad. Nat. Sci. Phila. 1894:259. Type locality, North Pacific salmon-cannery, mouth of Skeena River, British Columbia.

Distinctions. — From *oreas* by larger size, longer hind foot, relatively shorter tail, darker body colour, larger skull; from *borealis* by larger size, longer hind feet and tail, and larger skull.

Measurements.—Pitt Island series of twenty-two adults: Total length 212 mm. (215–226); 111 mm. (103–123); hind foot 24 mm. (23–25). Neckis River series: 218 mm. (208–234), 117 mm. (110–128), 24 mm. (23–25).

Distribution. — South to Rivers Inlet and north at least to Wrangell, Alaska. Occurs on Porcher, Princess Royal, Pitt, Banks, Swindle, McCauley, North Estevan, Calvert, King, and Aristazabal Islands. Records are: Kingcome Inlet, Beaver seining-grounds on Rivers Inlet, Koeye River, Lowe Inlet, Namu, Neckis River, Bella Coola, Hagensborg, Stuie (intergrades with *artemisiæ*), Ocean Channel, Kimsquit, Metlakatla, North Pacific cannery, Inverness, Port Simpson, Dokdaon Creek, Flood Glacier and Great Glacier on the Stikine River, Pitt Island, Larson Harbour on Banks Island, Colby Bay, Khutze Inlet, Kynoch Inlet, west end of Eutsuk Lake.

Peromyscus maniculatus oreas Bangs

Bangs, Proc. Biol. Soc. Wash. *12*:84, 1898. Type locality, Mount Baker Range, British Columbia, near boundary of Whatcom County, Washington.

Distinctions.—This is the pale-coloured, long-tailed deer mouse of the sub-alpine areas along the mainland coast. Distinguishing features from *austerus, artemisiæ*, and *macrorhinus* are given under those subspecies.

Measurements.—Eighteen adults from the northern end of the range measured: Total length 204 mm. (194–211); tail 109 mm. (101–117); hind foot 23 mm. (22–24).

Distribution.—From the International Boundary at Cultus Lake east to Lightning Lakes at Hope–Princeton summit, north to Rivers Inlet. Localities represented are: Mount Seymour, Cypress Lake.

Cultus Lake, Chilliwack, Lihumitson Park, Hope, Allison Pass, Alta Lake, Garibaldi Park, Pemberton Meadows, Tenquille Lake, Lillooet, head of Loughborough Inlet, Kingcome Inlet, Bute Inlet (head), Owikeno Lake, and head of Rivers Inlet (intergrades with *macrorhinus*).

Remarks.—There is gradual blending between *austerus* and *oreas* between Aldergrove and Cultus Lake along the International Boundary and up the slopes of the adjacent hills. In general this is the subspecies of the mountain-slopes, *austerus* of the coastal plain. At Loughborough and Bute Inlets, *austerus* and *oreas* can be taken on the same area without apparent intergrading. The intergrades between *artemisiæ* and *macrorhinus* have many of the characteristics of *oreas*, and this has led to the records of the latter race from the head of the Bella Coola Valley and other inlet heads near where these intergrades occur.

Peromyscus maniculatus pluvialis McCabe and Cowan

McCabe and Cowan, Trans. Roy. Canad. Inst. *25* (2):199, 1945. Type locality, Goose Island, British Columbia.

Distinctions.—Darker and more reddish than *macrorhinus*, tail shorter and body slightly longer—ratio 99 per cent; skull larger in almost all features.

Measurements.—Fourteen adults have the following means and extremes: Total length 209 mm. (196–222); tail 105 mm. (101–114); hind foot 25 mm. (24–26).

Distribution.—Goose Islands, British Columbia.

Peromyscus maniculatus rubriventer McCabe and Cowan

McCabe and Cowan, Trans. Roy. Canad. Inst. *25* (2):192, 1945. Type locality, Ruth Island near Hunter Island, British Columbia.

Distinctions.—Size larger and tail shorter than *macrorhinus* and with skull broader. The darkest and most saturate of all subspecies. Abdomen either entirely red or striped or spotted with red in from 100 to 58 per cent of individuals on different islands. Tail heavy, dark below as well as above, upper surface of hind foot dark. Young almost black.

Measurements.—A series of thirteen adults from Ruth Island measured: Total length 218 mm. (196–236); tail 113 mm. (107–123); hind foot 24 mm. (21–25).

Distribution.—Hunter and small adjacent islands, Reginald, Smythe, Townsend, Horsfall, Dufferin, Campbell, Hecate, and Chatfield Islands.

Peromyscus maniculatus sartinensis Guiguet

Guiguet, Ann. Rept. B.C. Prov. Mus. 1954:69, 1955. Type locality, Sartine Island, British Columbia.

Distinctions.—Similar to *triangularis* in external measurements but without white markings on the head, and more reddish in dorsal colour. Underparts more white than *triangularis*. Smaller than *triangularis* in many cranial features and larger in others, thus giving a skull of different proportions.

Measurements.—Fourteen adults from the type locality measured: Total length 236 mm. (225–250); tail 118 mm. (112–125); hind foot 28 mm. (27–29).

Distribution.—Confined to Sartine Island in the Scott Island group off the north end of Vancouver Island.

Peromyscus maniculatus saturatus Bangs

Bangs, Amer. Nat. *31*:75, 1897. Type locality, Saturna Island, British Columbia.

Distinctions.—Similar to *austerus* but of richer hue, particularly on sides; size larger, including skull.

Measurements.—Average of ten adults: Total length 189 mm. (176–203); tail 88 mm. (77–96); hind hoot 22 mm. (21–23).

Distribution.—Confined to Saturna Island, Strait of Georgia.

Peromyscus maniculatus saxamans McCabe and Cowan

McCabe and Cowan, Trans. Roy. Canad. Inst. *25* (2):198, 1945. Type locality, Duncan Island, British Columbia.

Distinctions.—Nearest *doylei* in dimension, larger than *interdictus*. Differs from *doylei* in cranial details (*see* McCabe and Cowan, 1945).

Measurements.—Fourteen specimens from Duncan Island measured: Total length 215 mm. (206–227); tail 110 mm. (104–116); hind foot 24.3 mm. (23–25.5).

Distribution.—Duncan, Heard, Hurst, and Bell Islands.

Peromyscus maniculatus triangularis Guiguet

Guiguet, Ann. Rept., B.C. Prov. Mus. 1954:69, 1955. Type locality, Triangle Island, British Columbia.

Distinctions.—Larger than other races of *Peromyscus* except *sartinensis,* from which it differs in cranial features and in the presence of a white blaze on the forehead in most individuals. Underparts grey, whitish in the inguinal region. Sexes alike in size.

Measurements. — Fourteen specimens from the type locality measured: Total length 231 mm. (215–239); tail 121 mm. (111–125); hind foot 28 mm. (27–29).

Distribution.—Confined to Triangle Island in the Scott Island group situated off the north end of Vancouver Island.

Sitka Mouse

Peromyscus sitkensis prevostensis Osgood

Osgood, North Amer. Fauna *21*:29, 1901. Type locality, Prevost (now Kunghit) Island, Queen Charlotte Islands, British Columbia.

Description.—Very large size and short tail, along with several cranial characters, including elongated slit-like posterior palatine foramina, distinguish this species from *maniculatus.*

Measurements.—Eleven specimens from Frederick Island measured: Total length 219 mm. (205–229); tail 104 mm. (96–113); hind foot 26 mm. (24–27); ear from notch (dry) 15.6 mm. (14.4–16.4). Weights of nine individuals: Mean 41 grams (34–46).

Distribution.—Known from Kunghit Island (formerly Prevost), Frederick Island, and Hippa Island, of the Queen Charlotte Islands group, British Columbia. There are no significant differences between our series.

Habitat.—Throughout all habitats on certain outer islands of the Alaskan Archipelago and Queen Charlotte Islands.

Biology.—Apparently two litters of young per year averaging six young per litter. Food consists largely of small invertebrates (molluscs and crustacea) and spruce seed.

Genus NEOTOMA—Wood Rats

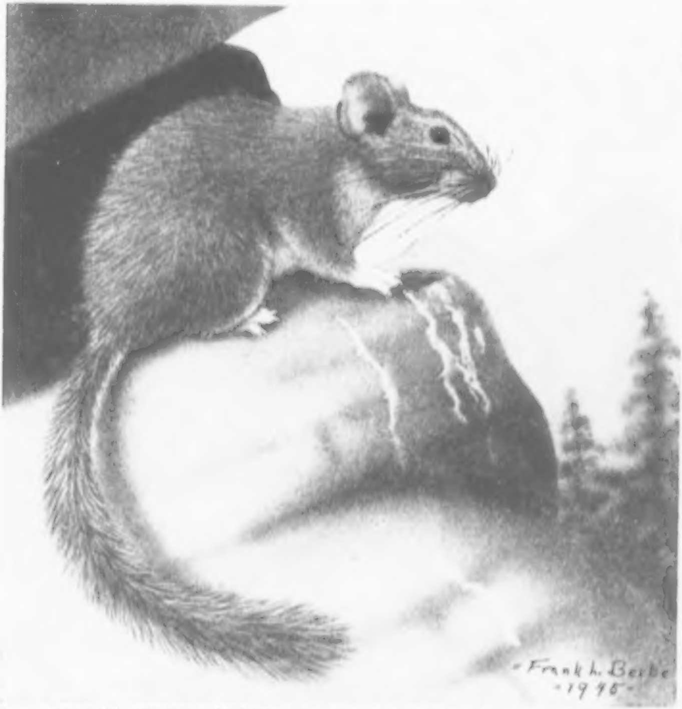


Plate 33. Bushy-tailed Wood Rat or Pack Rat, *Neotoma cinerea.*

Bushy-tailed Wood Rat (Pack Rat)

Neotoma cinerea (Ord)

Description. — This native rat of the western mountains is slightly larger than the common brown rat. Total length when full grown about 16 inches, of which 3½ inches are the tail. Body colour of adults is brownish-grey, that of the young blue-grey; feet, underparts, and underside of tail white; ears large, erect, and hairless; eyes prominent and black. The tail is bushy, but the hairs shorter than in a squirrel; soles of the feet furred. In adult animals there is a large scent gland in the middle of the abdomen that is particularly prominent in males and gives off an unpleasant-smelling, yellowish, oily secretion. Whiskers very long, reaching to the shoulders. Immature animals are bluish-grey to slate-grey, and have tail hairs shorter.

Habitat.—The wood rat has a preference for broken rock, and most frequently occurs in cliffs, gullies, or talus. However, mine shafts, old buildings, or even the open forest floor may serve as a nest-site. It tolerates a wide climatic range, from coastal rain forest to the extremes of aridity.

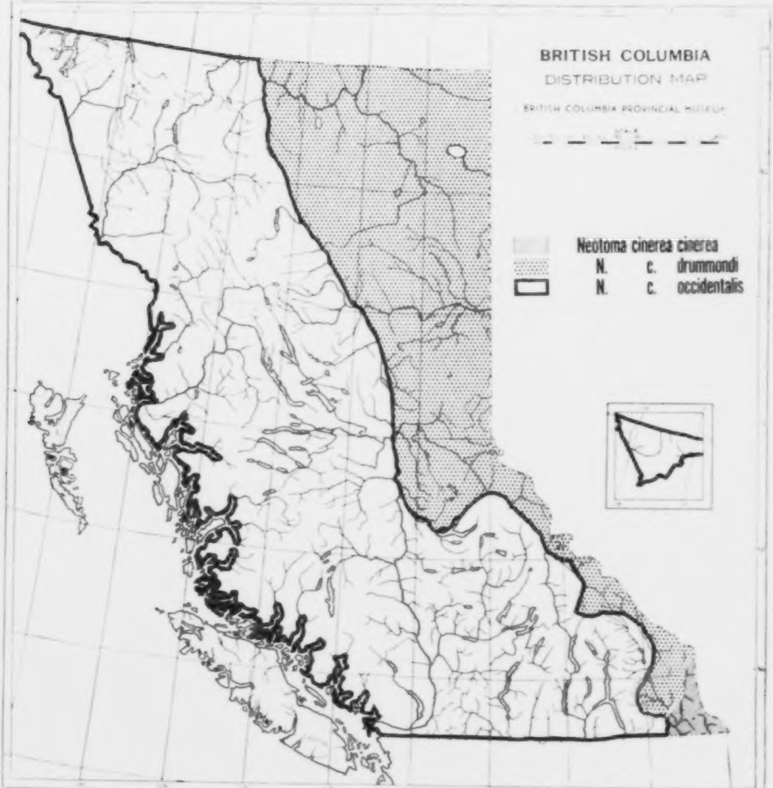
Biology.—The pack rat is almost omnivorous, and eats large quantities of green and dried vegetation, mushrooms, fruits, seeds, and animal matter such as dead meat, insects, and small reptiles. Dried vegetation is stored for winter use. The young are born from early May to late June and number from two to six, probably one litter per year. Small young have been taken in October. It often builds large " nests " of sticks and debris either in the open or in a rock cleft or similar location. Generally these nests are not occupied by the animal and constitute more of a storage dump. The true nests are cup-shaped, and made of finely shredded plant material softly lined. These are placed in sheltered locations but are not covered. In colonies occupied for many years the accumulated fæces and urine often becomes a hard black flinty mass, not unlike dried tar. It is frequently brought in as some strange mineral.

SUBSPECIES

Neotoma cinerea cinerea (Ord)

Ord, Guthrie's Geog., 2nd Amer. ed., 2:292, 1815. Type locality, near Great Falls, Cascade County, Montana.

Distinctions. — General dorsal colour ochraceous buff, with some intermixture of black hairs. Ankles, feet, and underparts


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Neotoma cinerea cinerea
N. c. drummondi
N. c. occidentalis

Map 27. Distribution of the Pack Rat or Bushy-tailed Wood Rat, *Neotoma cinerea.*

white. Tympanic bullæ large and postpalatal margin without a median spine.

Measurements.—Nine females from Idaho (Davis, 1939) averaged: Total length 370 mm.; tail 158 mm.; hind foot 42 mm. Four adult males: 408 mm.; 168 mm.; 44 mm.

Distribution.—Known only from the extreme south-eastern part of the Province, Akamina Pass, Morrissey, Newgate.

Neotoma cinerea drummondi (Richardson)

Richardson, Zool. Journ. *3*:517, 1828. Type locality, probably near Jasper House, Alberta.

Distinctions.—Very like *cinerea* but slightly more greyish in dorsal colour; dark colour of forelegs ending abruptly near wrist rather than blending gradually. Sphenopalatine vacuities small or absent.

Measurements.—Eight adults from Jasper, Alberta, and vicinity measured: Total length 397 mm. (372–447); tail 176 mm. (165–203); hind foot 48 mm. (42–51).

Distribution. — The Rocky Mountains and Selkirks north to Liard River and south an undetermined distance. Localities represented by specimens are: Summit Pass, 10 miles south and 70 miles west of Fort Nelson, Charlie Lake, Tupper Creek, Lower Liard Crossing, Toad River, Robb Lake (Laurier Pass), Mount Robson, Barkerville, Bowron Lake, Glacier, Paradise Mine, Kootenay Park.

Neotoma cinerea occidentalis Baird

Baird, Proc. Acad. Nat. Sci. Phila. *1*:335, 1855. Type locality, Shoalwater Bay, Pacific County, Washington.

Distinctions.—The main difference between this and the other subspecies is its darker colour, particularly noticeable on head and shoulders, and brownish rather than greyish or white ankles. The skulls differ from those of *cinerea* in having smaller bullæ and a median spine on the postpalatal margin.

Measurements.—Thirteen adults measured: Total length 398 mm. (380–423); tail 177 mm. (150–192); hind foot 45 mm. (40–49).

Distribution.—Widely distributed over the western two-thirds of the Province from the northern boundary south to the International Boundary west of the Rocky Mountain region. Representative localities of occurrence are: Bennett, Atlin, Glenora, Telegraph Creek, Kispiox, 15 miles east of Hazelton, Nulki Lake, Tiltzarone Lake, Inverness, Wistaria, Kimsquit, Hot Springs on Dean Channel, Stuie, Hagensborg, Lowe Inlet, Rivers Inlet, Lac la Hache, Chezacut, Bulkley Valley, Bute Inlet, Alta Lake, Lillooet, Ashcroft, Kamloops, Ducks, Shuswap, Revelstoke, Invermere, Nelson, Midway, Okanagan, Princeton, Keremeos, Hope, Chilliwack.

Remarks.—We have examined twenty specimens of adult *Neotoma* from northern British Columbia and have been unable to establish consistent differences that would permit the recognition of the described race *N.c. saxamans* Osgood. Accordingly we relegate this to the synonomy of *N.c. occidentalis* Baird.

GENUS SYNAPTOMYS—BOG-LEMMINGS

Plate 34. Northern Bog-lemming. *Synaptomys borealis*.

Northern Bog-lemming

Synaptomys borealis (Richardson)

Description.—A small, thick-bodied mouse, upper parts and sides dark brown, underparts greyish. Ears short, often concealed by the fur; tail very short, about as long as hind foot. Upper incisors with a longitudinal groove and often with the outer corners of the upper incisors projecting in a sharp point below general incisive margin (Fig. 15).

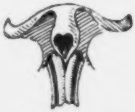


Fig. 15. Front view of upper incisors of bog-lemming to show grooved incisors and projecting outer edge of incisors.

Habitat.—Characteristically found in wet alpine and sub-alpine meadows, also in muskegs. Runways and burrows are well defined. During the winter it often moves to higher ground and lives among the heaths and sedges. One subspecies occurs in dry localities.

Biology.—Subsists largely on sedges, grasses, saxifrages and other plants; makes small piles of cuttings along its runways and, especially in winter, deposits its droppings in special places where as many as two cupfuls of them may accumulate. Young are two to eight in number, usually four or five. They are born from May through to late August. Winter nest on the surface consists of a ball of dry grasses and other vegetation about 8 inches in diameter. Summer nest usually underground.

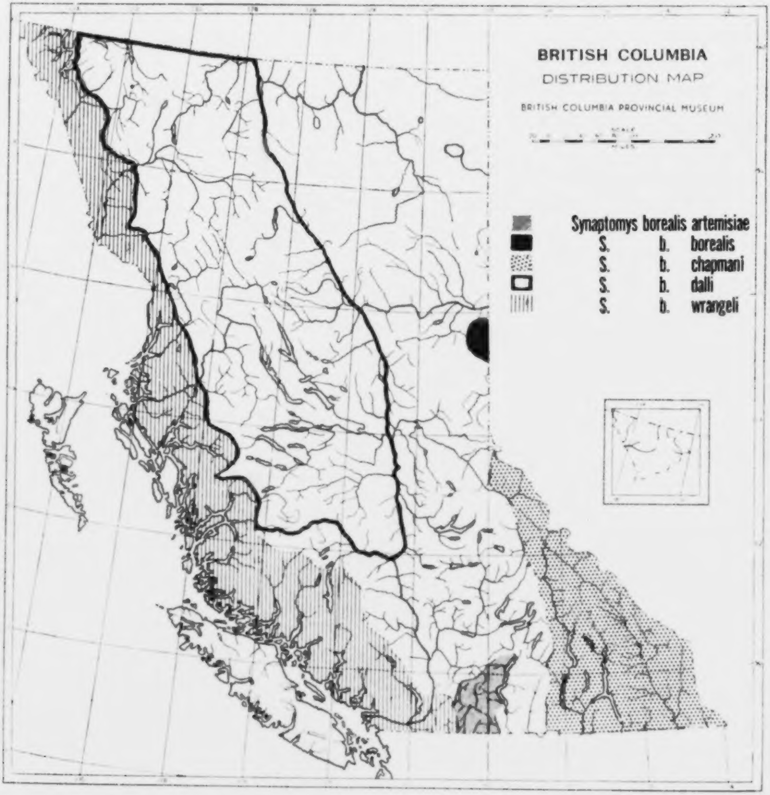
SUBSPECIES

Synaptomys borealis artemisiæ Anderson

Anderson, Ann. Rept. Nat. Mus. Canad. 1931:104, 1932. Type locality, Six Mile Creek south-west of Princeton, British Columbia.

Distinctions.—Paler and duller in colour and smaller in size than the other subspecies.

Measurements.—Average of six males: Total length 117 mm. (115–120); tail 22 mm. (21–23); hind foot 18.4 mm. (18–18.5). Average of three females: 116 mm. (113–130); 22 mm. (21–23); 17.3 mm. (17–18).


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Synaptomys borealis artemisiae
S. b. borealis
S. b. chapmani
S. b. dalli
S. b. wrangeli

Map 28. Distribution of the Northern Bog-lemming, *Synaptomys borealis.*

Distribution.—Known from the arid sagebrush slopes and adjacent plant associations near Princeton, and from the Okanagan.

Synaptomys borealis borealis (Richardson)

Richardson, Zool. Journ., *3*:517, 1828. Type locality, Fort Franklin, Great Bear Lake, Mackenzie, Canada.

Distinctions.—A dark, richly coloured race, darker than *dalli* and with deep brownish overtones on the dorsal surface.

Measurements.—Three males and a female from Tupper Creek measured: Total length 125 mm. (117–130); tail 19 mm. (16–22); hind foot 18.5 mm. (18–19).

Distribution.—Known only from the low-elevation muskegs near Tupper Creek in the Peace River Parklands, but probably has a wider distribution in that biotic area.

Synaptomys borealis chapmani Allen

Allen, Bull. Amer. Mus. Nat. Hist. *19*:555, 1903. Type locality, Glacier, British Columbia.

Distinctions.—A weakly characterized subspecies distinguished by its dull grey-brown coloration.

Measurements.—Means and extremes of eighteen adults: Total length 129 mm. (122–140); tail 23 mm. (20–27); hind foot 19 mm. (18–21).

Distribution. — Found in the Rocky and Selkirk Ranges of British Columbia and western Alberta. Specific records are: Moose Pass, Canoe River, Indianpoint Lake, Mount Revelstoke, Glacier, Thompson Pass, Wolverine Pass in Kootenay Park, Vermilion Crossing, Assiniboine, Rossland.

Synaptomys borealis dalli Merriam

Merriam, Proc. Biol. Soc. Wash. *10*:62, 1896. Type locality, Nulato, Alaska.

Distinctions.—A weakly characterized race; dorsal colour grey-brown with a bright chestnut suffusion. Incisive foramina short.

Measurements.—Means and extremes of eight adults: Total length 131 mm. (125–235); tail 28 mm. (26–29); hind foot 19 mm. (18–20).

Distribution.—The northern interior of the Province from the northern boundary south on the east of the Coast Ranges to Stuie. Specimens recorded from Atlin, Level Mountain, Klappan River, Telegraph Creek, Rapid River, McDame Post, Sustut River, Tetana Lake near Driftwood River, Sinkut Mountain, Sixteen Mile Lake west of Quesnel, Chezacut Lake, Puntchesakut Lake, Cluculz Lake, Cariboo Mountain near Stuie.

Synaptomys borealis wrangeli Merriam

Merriam, Proc. Biol. Soc. Wash., *10*:63, 1896. Type locality, Wrangel, Alaska.

Distinctions.—Most variable in colour, but typically dark, grey-brown, with a faint brighter brownish wash on the shoulders and back. Brain case flat, rostrum slender, anterior nares much arched.

Measurements.—Ten adults measured: Total length 131 mm. (123–140); tail 22 mm. (19–24); hind foot 19 mm. (18–20).

Distribution.—The coast mountain range and some of the adjacent inshore islands. Descends to sea-level on the north coast. Specimens from Atlin Lake, Great Glacier, Metlakatla, Port Simpson, Anahim Lake, Neckis River, Campbell Island, Yeo Island, Alta Lake, Allison Pass, Timberline Valley in Manning Park.

GENUS LEMMUS—LEMMINGS

Brown Lemming

Lemmus trimucronatus helvolus (Richardson)

Richardson, Zool. Journ. *3*:517, 1828. Type locality, near head of one of the southern tributaries of the Peace River in the Rocky Mountains, Alberta.

Description.—Easily recognized by its long, soft hair of bright tawny orange colour, shading to bright chestnut on the back. Very short tail coloured like the body; broad flattened skull with strong, prominent upper incisors.

Measurements.—Seven males from the Rainbow Mountains measured: Total length 156 mm. (146–170); tail 26 mm. (23–29); hind foot 22 mm. (21–24). Sixteen females from same area:

Total length 151 mm. (145–160); tail 25 mm. (22–29); hind foot 22 mm. (21–24).

Habitat.—Alpine meadows, occasionally entering the open subalpine timber where grass and weed-grown meadows occur.

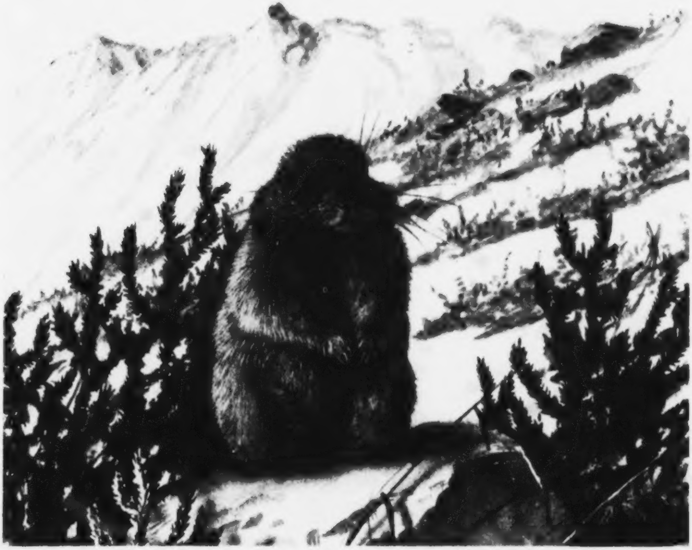
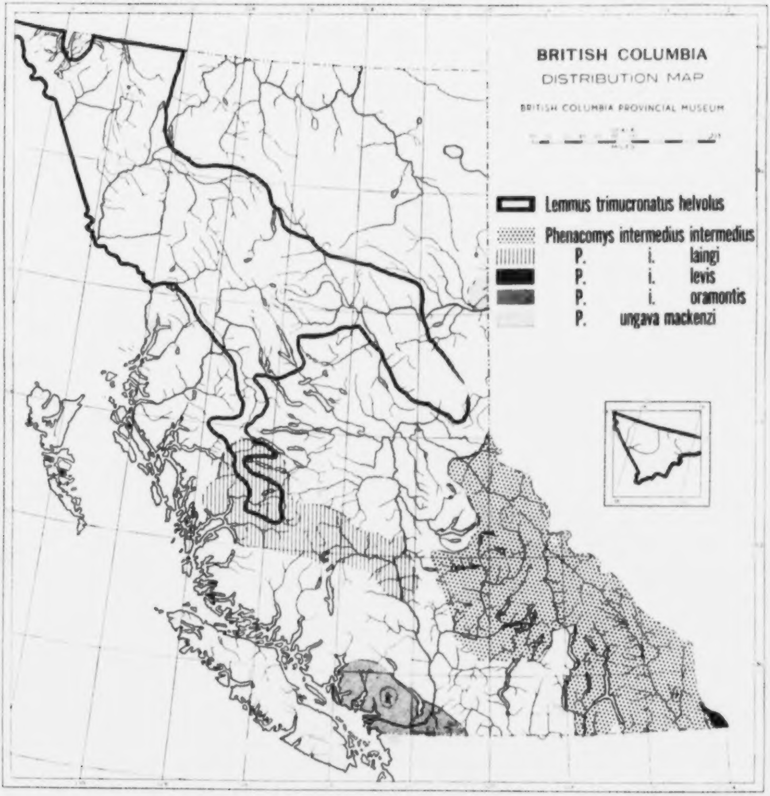


Plate 35. Brown Lemming, *Lemmus trimucronatus.*

Biology.—Little is known about this lemming. It periodically becomes very abundant locally in its mountain habitat when individuals are seen running about in broad daylight. It makes well-beaten runways through the alpine vegetation and places its summer nests underground. Winter nests are often on the surface. In late summer during periods of abundance there is a lot of movement, and many individuals swim lakes and rivers. On the Driftwood River in 1938 several were taken from the stomachs of large char. Litters vary from two to six and there are at least two per summer, probably more. Its food is entirely vegetation.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Lemmus trimucronatus helvolus
Phenacomys intermedius intermedius
P. i. laingi
P. i. levis
P. i. oramontis
P. ungava mackenzi

Map 29. Distribution of the Brown Lemming, *Lemmus trimucronatus*, of the Mountain Heather-vole, *Phenacomys intermedius*, and of the Arctic Heather-vole, *Phenacomys ungava*.

Distribution.—Widely distributed over the northern half of the Province from Atlin south in the east to the headwaters of the Peace River in the " Jasper House region," and in the west to Rainbow Mountains. Localities of occurrence are: Atlin, Cold Fish Lake, Bear Lake, Tatletuey Lake, Omineca Mountains, Tetana Lake, Wistaria, Laurier Pass, Sikanni Chief River headwaters, Kiskagus Creek, Mount Brilliant.

GENUS CLETHRIONOMYS—REDBACK VOLES

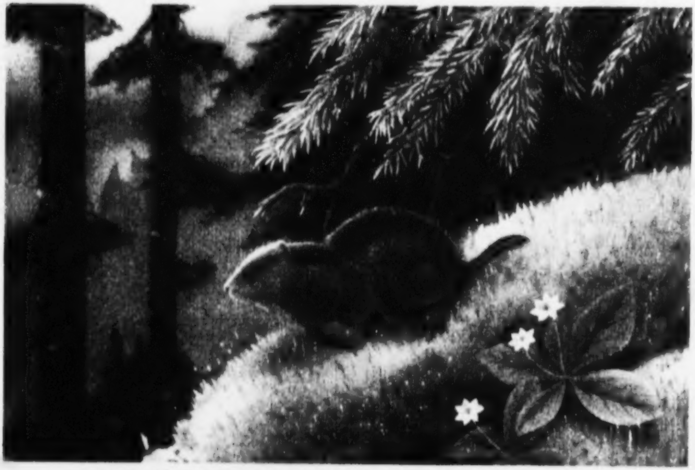


Plate 36. Boreal Redback Vole, *Clethrionomys gapperi.*

Boreal Redback Vole

Clethrionomys gapperi (Vigors)

Description.—The redback mice are among the most easily identified of the short-tailed mice or voles. They are small in size; sides vary in different races from grey to yellowish-brown; underparts are white or grey, but the back always bears a broad stripe of reddish-brown, varying much in hue, sometimes so darkened as to be barely distinguishable though generally conspicuous and clearly set off from the colour of the sides. Tail short, about twice the length of the hind foot; cheek teeth with roots (Fig. 16), incisors without grooves.

There are three species which are somewhat similar but which can be distinguished by superficial characters. *C. rutilus* has the tail shorter than the other two (i.e., about one and one-half the length of the hind foot), abundantly hairy, dark above, yellow beneath, *C. occidentalis* looks very like *Micortus oregoni serpens* (i.e., it is very dark in colour, with scarcely any red dorsally).

Habitat—The boreal redback vole is a forest species, inhabiting the litter of decaying tree-trunks and moss that covers the forest floor. In clearings it can be found under brush-piles and in similar locations. Above timber-line it is often abundant in the mossy talus-slides. It does not make runways on the surface but does burrow in mossy banks and light humus soil.

Biology. — Young number four to seven, mean 5.5 (Crowe, 1943); at least two litters are born between June and September. Food consists of forest seeds, mushrooms, grasses, berries of *Vaccinum* and *Arctostaphylos,* and many other plant products. Nests are constructed underground or in the shelter of logs or litter.

SUBSPECIES

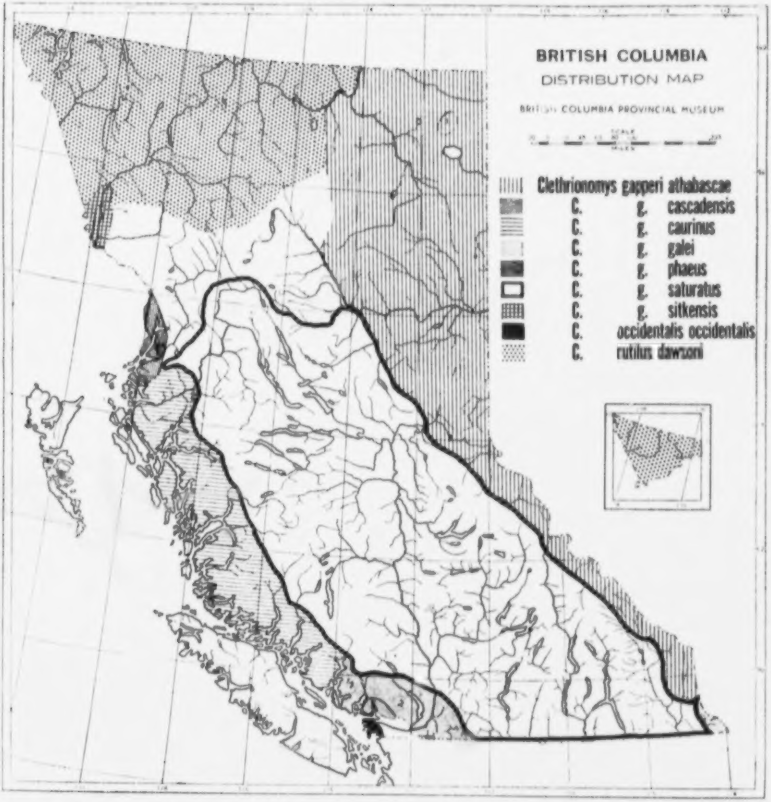
Clethrionomys gapperi athabascae (Preble)

Preble, North Amer. Fauna *27*:178, 1908. Type locality, Fort Smith, Northwest Territories.

Distinctions.—Large size, white underparts and clear grey sides, dorsal stripe ending abruptly at ears.

Measurements.—Fourteen adults from Jasper Park, Alberta, measured: Total length 145 mm. (130–146); tail 38 mm. (30–44); hind foot 18 mm. (16–20).

Distribution.—The Rocky Mountain region north to Muskwa River and Steamboat Mountain, south to Kootenay Park. Specimens examined from Muskwa River, Charlie Lake, Tupper Creek, Liard River, Keily Creek, Laurier Pass, Moose Pass, Thompson Pass, Assiniboine, Tornado Pass, Invermere (toward *saturatus*).


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Clethrionomys gapperi athabascae
C. g. cascadensis
C. g. caurinus
C. g. galei
C. g. phaeus
C. g. saturatus
C. g. sitkensis
C. occidentalis occidentalis
C. rutilus dawsoni

Map 30. Distribution of the Boreal Redback Vole, *Clethrionomys gapperi*, the Western Redback Vole, *Clethrionomys occidentalis*, and the Tundra Redback Vole, *Clethrionomys rutilus*.

Clethrionomys gapperi cascadensis Booth

Booth, Murrelet, *26*:27, 1945. Type locality, Blewett Pass, Kittitas County, Washington.

Distinctions.—Colour darker and duller dorsally than *saturatus;* more dusky all over, and with less buff on the underparts.

Measurements.—Means and extremes of fifteen adults: Total length 145 mm. (137–160); tail 43 mm. (36–52); hind foot 18 mm. (16–21).

Distribution.—Occurs in the Cascade Range north at least to the Alta Lake region. Specimens are known from Cultus Lake, Lihumitson Mountain, Manning Park, Mount Seymour, North Vancouver, Alta Lake.

Clethrionomys gapperi caurinus (Bailey)

Bailey, Proc. Biol. Soc. Wash. *12*:21, 1895. Type of locality, Lund, Malaspina Inlet, British Columbia.

Distinctions. — Duller in colour than *cascadensis* with back pinkish or vinaceous brown rather than chestnut brown; sides yellowish-olive; underparts grey with faint buff wash. Sometimes the dorsal colour extends completely over the sides and even onto the abdomen. Size small, tail short.

Measurements. — Means and extremes of twelve specimens taken on the coast between Powell River and Lowe Inlet: Total length 131 mm. (124–152); tail 38 mm. (32–45); hind foot 19 mm. (18–20).

Distribution.—The west side of the Cascade and Coast Ranges from Jervis Inlet north to Lowe Inlet. Specimens from Lewis Creek near Powell River, Lund, Beaver seining-ground on Rivers Inlet, Bella Coola, Lowe Inlet, Kimsquit, Hagensborg, Loughborough Inlet, Kingcome Inlet, Dufferin Island, Horsfall Island, Smythe Island, Princess Royal Island, Khutze Inlet.

Remarks.—Hall and Cockrum (1952) refer *caurinus* to the species *occidentalis* on the basis of rather variable skull characteristics. Our evidence, based upon the largest series of *caurinus* examined to date, does not support their conclusion. In our judgment this race is a member of the species *gapperi.*

Clethrionomys gapperi galei (Merriam)

Merriam, North Amer. Fauna *4*:23, 1890. Type locality, Ward, Boulder County, Colorado.

Distinctions.—Differs from *athabascæ* and *saturatus* in lighter colour and in having the interorbital region sharply concave, with prominent superciliary ridges.

Measurements.—Eight adults: Total length 147 mm. (142–151); tail 46 mm. (42–50); hind foot 18 mm. (15–19).

Distribution. — Known only from the southern part of the Canadian Rocky Mountains. Specimens from Akamina Pass and Wall Lake.

Clethrionomys gapperi phæus (Swarth)

Swarth, Univ. Calif. Publs. Zool. 7:127, 1911. Type locality, Martin Arm, Boca de Quadra, Alaska.

Distinctions. — Entire upper surface and sides rich reddish-brown, underparts pale buff. Tail longer than in the geographically adjacent subspecies.

Measurements. — Nine specimens from the type locality in Alaska measured: Total length 155.7 mm. (149–164); tail 51 mm. (46–58); hind foot 19.9 mm. (19–20) (Swarth, 1911).

Distribution.—The northern coast from the Alaskan border south to Port Simpson. Specimens from Port Simpson.

Clethrionomys gapperi saturatus (Rhoads)

Rhoads, Proc. Acad. Nat. Sci. Phila. *46*:284, 1894. Type locality, Nelson, British Columbia.

Distinctions. — Bright chestnut back, clearly delineated from greyish sides, whitish-grey underparts often have a buff wash; ears large, tipped with rufous; colour of back extending almost to level of the eyes.

Measurements. — Three specimens from Glacier measured: Total length 151 mm. (148–157); tail 51 mm. (48–55); hind foot 19 mm. (18–22).

Distribution.—This subspecies occurs over the entire Province south of the Boreal Forest Area, east of the Coast Mountains, and west of the Rockies. Localities of occurrence are Bear Lake, Tetana Lake, Moose Pass, Yellowhead Lake, Sinkut Creek, Hazelton, Francois Lake, Puntchesakut Lake, Nukko Lake, Lakelse, Wells Gray Park, Cottonwood, Indianpoint Lake, Quesnel, Stum Lake, Anahim Lake, Stuie, Lonesome Lake, west end of Eutsuk Lake, Ootsa Lake, Chezacut, Mount Revelstoke, Anarchist Mountain, Okanagan, Monashee Pass, Rossland, Nelson, Botanie Lake, Glimpse Lake (Nicola), Paradise Mine.

Remarks.—The redback mice from British Columbia east of the Coast Range, west of the Rocky Mountains, and south of the Stikine River are referred to as *C.g. saturatus* pending a revision of the genus. In this area the Skeena Valley is occupied by a brightly coloured long-tailed population, the Chilcotin District and Cariboo District by a brightly coloured short-tailed population, and the Selkirks by a large dark-coloured long-tailed population. We believe this last to represent *saturatus* and that the other populations indicated are distinct.

Clethrionomys gapperi stikinensis Hall and Cockrum

Hall and Cockrum, Univ. Kansas Publs., Mus. Nat. Hist., 5, No. 23:305, 1952. Type locality, Stikine River at Great Glacier, British Columbia.

Distinctions.—Medium-sized and dark-coloured form. Differs from *phæus* in having dorsal stripe and sides darker, as well as in smaller auditory bullæ and narrower teeth.

Measurements.—Average and extreme measurements of eleven specimens (Hall and Cockrum, op. cit.): Total length 135 mm. (125–147); tail 34 mm. (30–39); hind foot 19 mm. (19–20).

Distribution.—Locality records in British Columbia are Great Glacier and Flood Glacier, both stations on the Stikine River.

Western Redback Vole

Clethrionomys occidentalis occidentalis (Merriam)

Merriam, North Amer. Fauna *4*:25, 1890. Type locality, Aberdeen, Chehalis County, Washington.

Description.—The dull-brownish microtus-like colour pattern, with the red dorsal stripe barely distinguishable, makes this species easily separable from *gapperi*. Audital bullæ inflated and crowded closely over the basioccipital.

Habitat.—The forest floor in mixed second-growth forest stands.

Biology.—Nothing is known of the details of the biology of this species in British Columbia.

Measurements.—Specimens from adjacent Washington State measured: Total length 137 mm.; tail 45 mm.; hind foot 18 mm.

Distribution.—Known only from the extreme south coast, south of Burrard Inlet. One specimen from Point Grey, Vancouver.

Tundra Redback Vole

Clethrionomys rutilus dawsoni (Merriam)

Merriam, Amer. Nat. 22:650, 1888. Type locality, Finlayson River (61° 30′ N. and 129° 30′ W.).

Description.—The brighter colour with preponderance of yellow in the sides, the short, densely furred tail yellow beneath, small markedly flattened audital bullæ, and posterior margin of palate notched, distinguish this from the races of *gapperi*. There is a colour variety in which the red dorsum is replaced by dark brown or blackish.

Measurements.—Twelve adult specimens from Aklavik and Mount McKinley measured: Total length 140 mm. (133–154); tail 32 mm. (28–36); hind foot 19 mm. (18–21).

Habitat.—This northern species occupies the same niche in its range as does *gapperi* farther south.

Biology.—Not known to differ from *gapperi*.

Distribution.—Found only in the extreme northern part of the Province from Atlin south-east to Summit Pass on the Alaska Highway. Localities represented are Stonehouse Creek 5½ miles west of junction with Kelsall River, Atlin, Irons Creek, Muncho Pass, Lower Liard Crossing, Summit Pass, Junction near Telegraph Creek.

Plate 37. Mountain Heather-vole, *Phenacomys intermedius*.

Mountain Heather-vole

Phenacomys intermedius Merriam

Description.—This small grey vole is most difficult to distinguish from several species of the genus *Microtus.* Tail short and more slender than in most other voles. In adults the dorsal surface is predominantly grey-brown, the undersurface silvery grey. Tail generally silvery grey all around; upper sides of feet silvery grey; fur long and lax. Ears short, but usually projecting from the fur, sometimes faintly brown. The tooth pattern is completely diagnostic to genus. In *Phenacomys* the re-entrant angles on the inner side of the lower molars are deeper than those on the outer side (Fig. 16 (*a*)), whereas in *Microtus* they are approximately equal in depth (Fig. 16 (*b*)). Separable from *mackenzii* by grey rather than yellow nose.

Habitat.—This mouse displays considerable variety in habitat. Typically it is found in dry forests of lodgepole pine, where it lives under the decaying stumps and trunks, and in the patches of bearberry, *Arctostaphylos uva-ursi.*

Biology.—Nest a globular mass of dry grasses about 6 inches in diameter, often in a cavity in a dry decayed log. Young up to eight in number, usually four or five. Food a variety of vegetation, but the leaves and berries of bearberry are most important summer and winter and make up 85 to 90 per cent of the diet; *Shepherdia canadensis* makes up 6 per cent; *Rosa, Viccia,* and others 5 to 10 per cent. Often small piles of the leaves and fruits of bearberry are accumulated in hollows in logs and the stumps of dead trees. *Phenacomys* has been taken in the runways of *Microtus* and *Synaptomys* in moist sub-alpine meadows but makes no runway systems of its own except immediately around the nest.

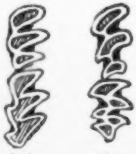


Fig. 16. Surface view of last right lower molar of (*a*) heather-vole and (*b*) field vole to show deep outer re-entrant angles of the former.

SUBSPECIES

(*See* Map 29, p. 201.)

Phenacomys intermedius intermedius Merriam

Merriam, North Amer. Fauna 2:32, 1898. Type locality, 20 miles north-west of Kamloops, British Columbia.

Distinctions.—The description above is adequate for this subspecies.

Measurements. — Means and extremes of ten adults: Total length 141 mm. (128–155); tail 35 mm. (28–39); hind foot 19 mm. (17–20).

Distribution.—Inhabits the arid parts of central British Columbia from Princeton and Anahim Lake in the west and Nelson in the east, north to Telegraph Creek. Specimen records are from

"Chapa-atan River" (Howell, 1926), Telegraph Creek, Nine Mile Mountain, Tetana Lake, Glacier, Wells Gray Park, Kamloops, Bridesville, Monashee Pass, Fairview, Okanagan, Nelson, Rossland, Paradise Mine, Newgate.

Phenacomys intermedius laingi Anderson

Anderson, Canad. Field-Nat. *56* (4):59, 1942. Type locality, Kimsquit River, Cornice Creek, British Columbia.

Distinctions.—Greyer than *intermedius* and lacking the brown wash over the dorsal parts. Skull longer and more slender, while more angular and with ridges more pronounced. About as in *oramontis* but dentition lighter.

Measurements.—Ten adult specimens measured: Total length 135 mm. (122–151); tail 32 mm. (26–41); hind foot 18 mm. (17–21).

Distribution.—Specimens exam[illegible] from head of Eutsuk Lake, Kimsquit River, Rainbow Mou[illegible]ns, Atnarko River, Caribou Mountains near Stuie, Chezacut Lake, Anahim Lake, and Lac la Hache.

Phenacomys intermedius levis Howell

Howell, Proc. Biol. Soc. Wash. *36*:157, 1923. Type locality, St. Mary's Lake, Teton County, Montana.

Distinctions.—Generally paler and more brownish than *intermedius*, but individual specimens may be indistinguishable. Skull is relatively smaller but rostrum more robust; bullæ larger.

Measurements.—Means and extremes of ten adult specimens—eight from Jasper and Banff, Alberta, and two from Field, British Columbia: Total length 138 mm. (128–151); tail 33 mm. (29–39); hind foot 18 mm. (17–20).

Distribution. — Assiniboine, Tornado Pass (toward *intermedius*), Moose River, Field.

Phenacomys intermedius oramontis Rhoads

Rhoads, Amer. Nat., *29*:941, 1895. Type locality, Church (Lihumitson) Mountain, Mount Baker Range, British Columbia.

Distinctions.—Much darker in colour than the other races, almost steel grey dorsally. The skull is larger and broader and more angular than in *intermedius;* supraoccipital less sloping, interorbital region broad and heavily ridged.

Measurements.—Six specimens from Mount Seymour and Alta Lake measured: Total length 138 mm. (126–151); tail 35 mm. (29–39); hind foot 18 mm. (16–21).

Distribution.—Mountains of the extreme south coast, Mount Baker Range, Mount Seymour, Mount Whistler near Alta Lake, Manning Park, Garibaldi Park.

Remarks.—The name *oramontis* is used to apply to the form from time to time referred to as *Phenacomys olympicus* Elliot and *Phenacomys orophilus* Miller (*see* Anderson, 1942).

Arctic Heather-vole

Phenacomys ungava mackenzii Preble

Preble, Proc. Biol. Soc. Wash. *15*:182, 1902. Type locality, Fort Smith, Northwest Territories.

Description.—Very like *Phenacomys intermedius* but distinguised by having a yellowish face region.

Measurements.—Eleven male topotypes measured: Total length 138 mm. (133–144); tail 32 mm. (29–34); hind foot 17 mm. (17–18) (Howell, 1926).

Habitat.—Specimens taken in the Peace River District were in open aspen glades near a small stream. There were no runways.

Biology.—Nothing is known of the food or reproductive habits.

Distribution.—Known in the Province only from near Charlie Lake, Tupper Creek, and from Atlin (Swarth, 1936).

Remarks.—Crowe (1943) believes that *Phenacomys intermedius* and *Phenacomys ungava* are conspecific. In our opinion this matter requires more detailed examination before a decision can be reached.

GENUS MICROTUS

Field Mice or Field Voles

Description.—The field mice are all stout-bodied mice with small ears covered with fine fur, and a tail short in comparison with the white-footed mice or house mice. The fur is usually long, relatively coarse and lax. In all species occurring in the Province the body colour varies in shades of grizzled grey or grizzled brown sometimes with a yellowish cast to the brown. The long and abundant guard hairs are black. The tail is obscurely bicolour, the tops of the feet usually dark grey, and the underparts from dark grey to silvery grey or whitish. The soles of the hind feet have five or six pads. While the species are in general easily distinguishable by colour or proportion of tail to body, some individuals of some species are very difficult. In these the pattern of the tooth surfaces is usually reliable (Fig. 17). Even in those with rather distinct differences of colour or fur texture, it is difficult to describe the differences.

The genera *Microtus, Synaptomys,* and *Phenacomys* are superficially very similar and will require care in separation. The easiest characteristics for identifying *Synaptomys* are the very short tail, not much more than half again as long as the hind foot, and the longitudinally grooved incisors (Fig. 15). *Phenacomys* is more difficult, but the slender, silvery tail and hind feet with the generally pale-greyish dorsal colour are usually sufficient; positive identification can only be made on the basis of molar tooth pattern (Fig. 16). Occasional individuals occur in *Microtus* that are pinkish-buff all over.

Biology.—One general comment is applicable to all the voles. They are given to great variations in size of population, and during periods of high density they can do much damage in cultivated field crops, root crops, or in orchards. Food generally includes a wide variety of vegetation, green grasses, sedges, and herbs, roots, bulbs, seeds, and fruits. Small amounts of animal material are eaten. Young number up to eleven per litter, with six most frequent. Litters can follow each other at twenty-five-day intervals. The gestation period is twenty-one days.

Creeping Vole

Microtus oregoni serpens Merriam

Merriam, Proc. Biol. Soc. Wash. *11*:75, 1897. Type locality, Agassiz, British Columbia.

Plate 38. Creeping Vole, *Microtus oregoni.*

Description.—Size small, legs and tail short, ears almost concealed in the fur, fur-texture plush-like with guard hairs projecting little beyond the underfur. Body colour a uniform dull brown, sometimes sooty brown; underparts, feet, and tail dark grey. Skull small and delicate, little development of ridges except in oldest males. Tooth pattern distinctive (Fig. 17 (*c*)).

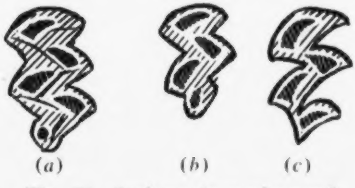


Fig. 17. Surface views of second upper molar teeth of (*a*) meadow vole (*Microtus pennsylvanicus*), (*b*) mountain vole (*Microtus montanus*), and (*c*) creeping vole (*Microtus oregoni*).

Habitat. — Confined to the deciduous forest region of the Puget Sound Lowlands Biotic Area, where it lives largely underground burrowing in the loose soil and making elaborate runways under fallen logs half buried in the soil. Where dense grass occurs, surface runways are used but seldom pass far from burrow to burrow. On the edges of cultivated fields and in orchards the extensive burrow systems often bring the mouse into potato storage-pits and root-cellars where much damage may be done. Use is made of the burrows of the Coast mole and Gibb's shrew mole.

Biology.—The creeping vole feeds on a wide variety of plant stems and roots, frequently eats tulip bulbs, potatoes, and other plant crops; fallen apples are often consumed from beneath. The breeding season extends from March to September, with as many as five broods per season. Young mature at twenty-two days in females, forty-two days in males. Litters vary from one to five, averaging 2.95; gestation period 23.8 days (Cowan and Arsenault, 1954).

This is the only subspecies occuring in the Province, and the description above will distinguish it from other species of voles.

Measurements.—Twenty adults from the Lower Fraser Valley measured: Total length 138 mm. (125–153); tail 35 mm. (29–39); hind foot 18 mm. (16–20).

Distribution.—The delta of the Fraser River from Hope to Vancouver, north to Agassiz, east to Allison Pass, and south to Washington State. Does not occur north of Burrard Inlet. Localities of occurrence: Allison Pass in Manning Park, Agassiz, Chilliwack, Huntingdon, Langley, Port Moody, Vancouver.

Richardson Vole (Water Rat)

Microtus richardsoni richardsoni (DeKay)

DeKay, Zool. New York, Mammals, p. 19, 1842. Type locality, probably near Jasper House, Alberta.

Description.—A giant among the voles and the largest member of the genus. Body colour dark grizzled reddish-brown; underparts grey, sometimes with white spotting. Tail long and thick. Skull broad, heavily ridged on occiput and behind orbits, rostrum long and stout, incisors projecting forward.

Measurements.—Means and extremes of twenty adults: Total length 252 mm. (234–274); tail 83 mm. (66–98); hind foot 30 mm. (27–34).

Habitat. — The banks of mountain streams near timber-line where it prefers the mixed stands of low willows and dense herbage.

Biology.—Constructs shallow burrows in which the summer nest is placed and sometimes, when abundant, makes fairly extensive tunnels. The surface runways are broad and distinct and almost always lead into the water. Under snow the nests are often made on the surface of the ground. In general behaviour it is much like a small muskrat, swimming and diving well. It feeds on a wide variety of vegetation, including valerian, louse-wort, arnica, sneezeweed, lupine, and willow. Little grass or sedge is

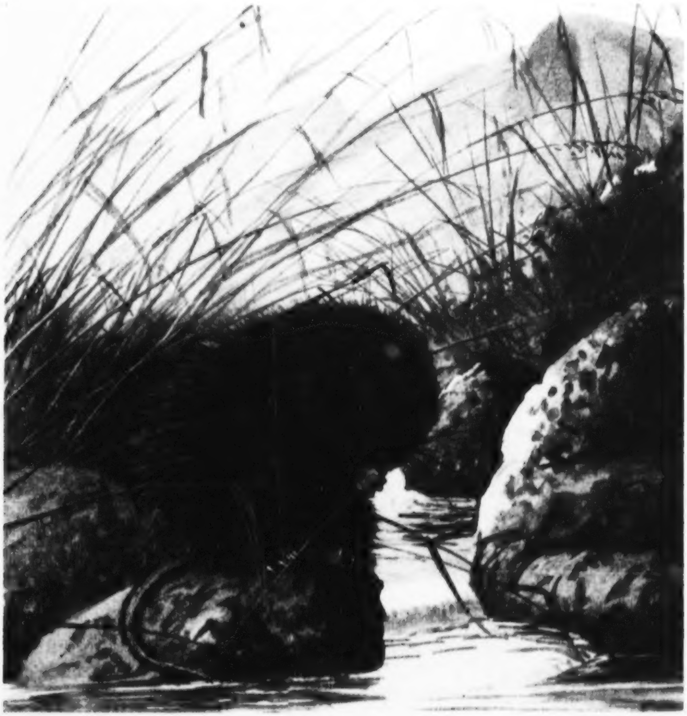


Plate 39. Richardson Vole or Water Rat, *Microtus richardsoni*.

eaten. Young number from two to eight, mean five; they are born from late June to late September.

Distribution.—At timber-line in the mountain ranges from the coast to the Rockies. During years of peak numbers it sometimes descends to lower elevations. North in the Coast Range to Gold Bridge near Lillooet, in the Selkirks to Mount Revelstoke, and in the Rockies to the latitude of Mount Robson. Localities: London Mountain, Gold Bridge, Tenquille Lake, Mount Revelstoke, Wolverine Pass in Kootenay National Park, Smoky River, Paradise Mine, Rossland, Hope–Princeton summit, Lihumitson Mountain, Mount Cheam, McGillivray Creek, Mount Assiniboine, Tornado Pass (*see* Map 32, p. 222).

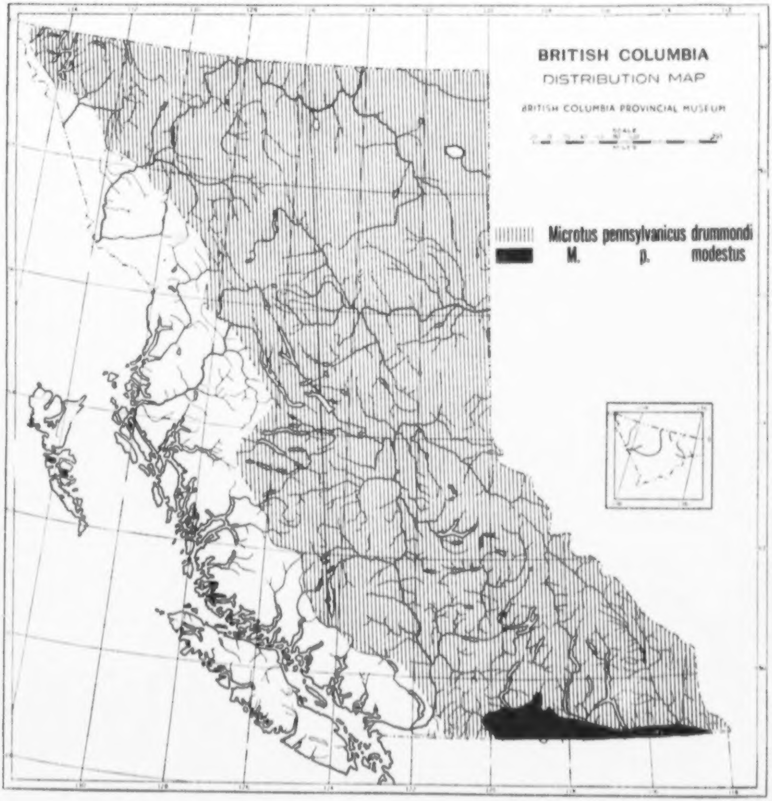
Meadow Vole

Microtus pennsylvanicus (Ord)

Description.—A moderate-sized, typical field mouse; colour more variable than most species, varying from grizzled grey to grizzled brown; underparts grey, in winter whitish. Summer pelage darker than winter. Tail about one-third length of head and body. The tooth pattern with four closed triangles and a posterior column on the second upper molar is diagnostic (Fig. 17 (*a*)).

Habitat.—Occurs in a variety of habitats that provide an abundance of ground cover of sedges, grass, and weeds, usually near water. Cultivated fields, wild meadows, wet alpine meadows, forest glades, and sedge meadows, or borders of tundra ponds are some of the usual sites occupied.

Biology.—Food is largely green plant material of great variety; runways are characteristic of this species and may form a complicated network on the surface and connect with an underground labyrinth. It is an excellent swimmer and its runways frequently enter water. Young number one to eleven with a mean of 3.5; gestation twenty-one days. Four or more litters may be born to a single female in one year. Young mature at thirty to forty days.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Microtus pennsylvanicus drummondi
M. p. modestus

Map 31. Distribution of the Meadow Vole, *Microtus pennsylvanicus.*

SUBSPECIES

Microtus pennsylvanicus drummondi (Audubon and Bachman)

Audubon and Bachman, Quadr. North Amer. *3*:106, 1854. Type locality, probably Jasper House, Alberta.

Distinctions.—So variable in size and colour that it has been suggested that several different recognizable races exist. Size is the best criterion for separating this subspecies from the next.

Measurements.—Thirty specimens from northern British Columbia and Northwest Territories measured: Total length 154 mm. (140–176); tail 40 mm. (29–52); hind foot 20 mm. (17–21).

Distribution. — The entire Province east of the Coast Range except for the extreme southern part. Selected localities of occurrence are Charlie Lake, Tupper Creek, Atlin, 1 mile west of Trutch, Lower Liard Crossing, junction of Irons Creek and Liard River, Muncho Lake, Sikanni Chief River, Laurier Pass, Dokdoan Creek, Glenora, Telegraph Creek, Hazelton, Ootsa Lake, Lac la Hache, Monashee Pass, Salmon Arm, Glacier, Vermilion Crossing, Thompson Pass, Mount Assiniboine.

Remarks.—Dale (1940) and later Hall (1953) propose the recognition of *M.p. rubidus, M.p. microcephalus,* and *M.p. funebris* from British Columbia. There is no geographic basis for the suggested treatment, and the large series we have examined reveals no basis for the proposed subspecies. We have come to the same conclusion as Rand (1943) and recognize only *drummondi* and *modestus* in the Province.

Microtus pennsylvanicus modestus (Baird)

Baird, Mammals *in* Rep. Expl. Surv. Rails. to Pacific, *8* (Pt. 1):535, 1857. Type locality, Cochetopa (Sawatch) Pass, Saguache County, Colorado.

Distinctions.—Slightly more reddish-brown dorsally than *drummondi,* but size is the best criterion. This race is larger than *drummondi,* with a larger, more robust skull; the specimens from British Columbia average smaller than those from Idaho and south.

Measurements.—Measurements of seven specimens from Newgate: Total length 168 mm. (161–174); tail 45 mm. 44–51);

hind foot 21 mm. (20–21). Seven others from the Similkameen Valley had the following measurements: 175 mm. (165–180); 49 mm. (45–53); 20 mm. (19–21) respectively.

Distribution.—South central and south-eastern areas at low elevations. Specific locality records are Invermere, Newgate, Yahk, Goatfell, Morrissey, Creston, Erickson, Pend d'Oreille River, Rossland, Westbridge, Oliver, Penticton, McGillivray Creek, Fairview–Keremeos summit.

Remarks.—This subspecies intergrades with *drummondi* in the northern part of the Okanagan Valley and the Upper Similkameen Valley; in the south-east it is largely a race of the valley-bottoms, while *drummondi* occurs at higher elevations.

Mountain Vole

Microtus montanus canescens Bailey

Bailey, Proc. Biol. Soc. Wash. *12*:87, 1898. Type locality, Conconully, Okanogan County, Washington.

Description.—Upper parts grizzled steel grey, with an intermixture of black hairs. Underparts grey in summer, white in winter. Tail less than one-third length of head and body, dark above, whitish beneath. Feet silvery grey above. Upper molar teeth with distinctive crown pattern (Fig. 17 (*b*)).

Measurements.—Means and extremes of nine adults from Kamloops and the Okanagan Valley: Total length 152 mm. (134–165); tail 38 mm. (31–45); hind foot 19 mm. (18–20).

Habitat.—The arid grasslands of the sagebrush community and the grassland community altitudinally higher.

Biology.—Little is known of the biology of this vole.

Distribution.—Confined to the grasslands of the Okanagan Valley and Kamloops, eastward into the Kettle Valley. Specific locality records are Westwick Lake, 12 miles west of Williams Lake, Kamloops, Lac du Bois, Vernon, Anarchist Mountain, Okanagan Landing, Osoyoos, Midway, Myers Creek (*see* Map 32, p. 222).

Townsend Vole

Microtus townsendi (Bachman)

Description.—A large vole with tail longer in proportion than in *pennsylvanicus* or *montanus* but shorter than *longicauda*. Tail one-third length of head and body. Dorsal surface from deep chocolate brown to rich mahogany brown with little grizzling and a varying density of black guard hairs sometimes so few as to be hardly noticeable, at other times forming an almost black mid-dorsal area. Underparts grey or whitish grey. Tooth pattern the same as in *longicauda*.

Habitat.—The moist fields and sedge meadows of the alluvial areas of the Fraser River delta and similar areas on Vancouver Island, where, however, it occurs also to timber-line and above in the alpine and sub-alpine meadows. The dense lush vegetation of certain large and small islands used as sea-bird rookeries are also favoured. Makes surface runways and extensive underground tunnels in loose soil.

Biology.—Food is largely the tender stem bases and roots of grass and sedge, but many other succulent plant stems are eaten. At high altitudes on Vancouver Island some white-heath is taken. Nests are largely underground, young number one to nine, average four; the breeding season extends from March to September. This species is the main food of the barn and short-eared owls, marsh hawks, and foxes of its range.

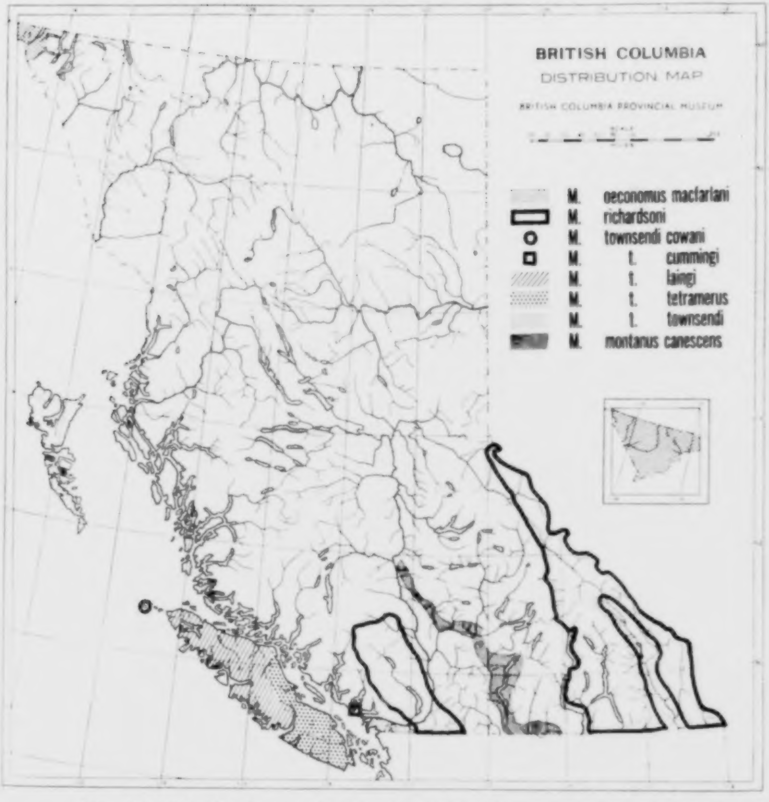
SUBSPECIES

Microtus townsendi cowani Guiguet

Guiguet, Ann. Rept. B.C. Prov. Mus. 1954:67, 1955. Type locality, Triangle Island, British Columbia.

Distinctions.—Largest of the Townsend voles; distinguished by the woolly texture of the fur; chin and tail-tip white and a white mark often present on the forehead. Sexes are alike in size.

Measurements.—Eighteen adults from the type locality measured: Total length 220 mm. (202–235); tail 70 mm. (61–75); hind foot 28 mm. (27–29).


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
M. oeconomus macfarlani
M. richardsoni
M. townsendi cowani
M. t. cummingi
M. t. laingi
M. t. tetramerus
M. t. townsendi
M. montanus canescens

Map 32. Distribution of the Tundra Vole, *Microtus œconomus*, of the Richardson Vole, *Microtus richardsoni*, of the Townsend Vole, *Microtus townsendi*, and of the Mountain Vole, *Microtus montanus*.

Distribution.—Confined to Triangle Island in the Scott Island group situated off the north end of Vancouver Island.

Microtus townsendi cummingi Hall

Hall, Murrelet, *17*:15, 1936. Type locality, Bowen Island, Howe Sound, British Columbia.

Distinctions.—Like *townsendi* in external characters but with relatively broader skull and with incisive foramina greatly narrowed posteriorly.

Measurements.—Ten adults of both sexes: Total length 176 mm. (169–181); tail 55 mm. (50–59); hind foot 25 mm. (24–25.5).

Distribution.—Occurs only on Bowen Island and Texada Island, where it is the only vole.

Microtus townsendi laingi Anderson and Rand

Anderson and Rand, Canad. Field Nat. *57*:4, 1943. Type locality, Port Hardy, Vancouver Island, British Columbia.

Distinctions.—Larger than the other races except *cowani*, but much the same in colour. The Townsend voles of Vancouver Island exhibit a size cline from south to north; the present subspecies represents the large northern form.

Measurements. — Ten adult males: Total length 207 mm. (194–225); tail 64 mm. (53–70); hind foot 24.5 mm. (23.5–26).

Distribution.—Vancouver Island from Cape Scott south about to Sayward, and to Beaver Creek near Alberni, intergrades completely with *tetramerus* over a large area. Occurs also on Hope, Hurst, and Nigei Islands.

Microtus townsendi tetramerus (Rhoads)

Rhoads, Proc. Acad. Nat. Sci. Phila. *46*:23, 1894. Type locality, Victoria, British Columbia.

Distinctions.—Differs from *laingi* in smaller size, and from *townsendi* in smaller size, duller colour and skull flat or concave rather than convex in profile, and posterior ends of nasals rounded or pointed, not truncate.

Measurements. — Eleven adults from Victoria and vicinity: Total length 176 mm.; tail 51 mm.; hind foot 22 mm.

Distribution.—Vancouver Island, especially the east coast from Victoria to Comox (also the west coast to Alberni). Specimens from Bunsby Island, Alberni, small island 2 miles north-east of Tofino, Forbidden Plateau, Mount Arrowsmith, Cowichan Bay, Departure Bay, Jordan Meadows, Saltspring Island, Goldstream, Victoria.

Microtus townsendi townsendi (Bachman)

Bachman, Journ. Acad. Nat. Sci. Phila. *8* (Pt. 1):60, 1839. Type locality, near mouth of Columbia River.

Distinctions.—The most richly coloured of all the subspecies; further distinguished as described under the foregoing races.

Measurements.—Twenty adults from areas listed measured: Total length 191 mm. (170–222); tail 57 mm. (48–72); hind foot 24 mm. (22–25).

Distribution.—The Puget Sound Lowlands Biotic Area from Hope to Vancouver and south into the State of Washington. Does not occur north of Burrard Inlet. Localities of occurrence: Chilliwack, Huntingdon, Aldergrove, Port Moody, Crescent Beach, Point Grey, and Lulu Island.

Long-tailed Vole

Microtus longicaudus (Merriam)

Description.—The grizzled rather coarse pelage and long tail, only slighly short than head and body, set this species apart from all the others and make it one of the easiest to identify.

Habitat.—Extremely variable. Usually this species occurs in forest-edge habitats from sea-level to altitudes of 4,000 feet, but on some of the coastal islands it inhabits sedge and grass meadows. It seldom makes runways and seldom lives in large colonies except during peaks in abundance. This species is ecologically separated from *townsendi* and usually from *pennsylvanicus*.

Biology.—The food is much as in other microtus. Young number from three to seven with average litter of five. The breed-

Plate 40. Long-tailed Vole, *Microtus longicaudus*.

ing season on the coast is from April to September, but in the interior and sub-alpine localities it is shorter.

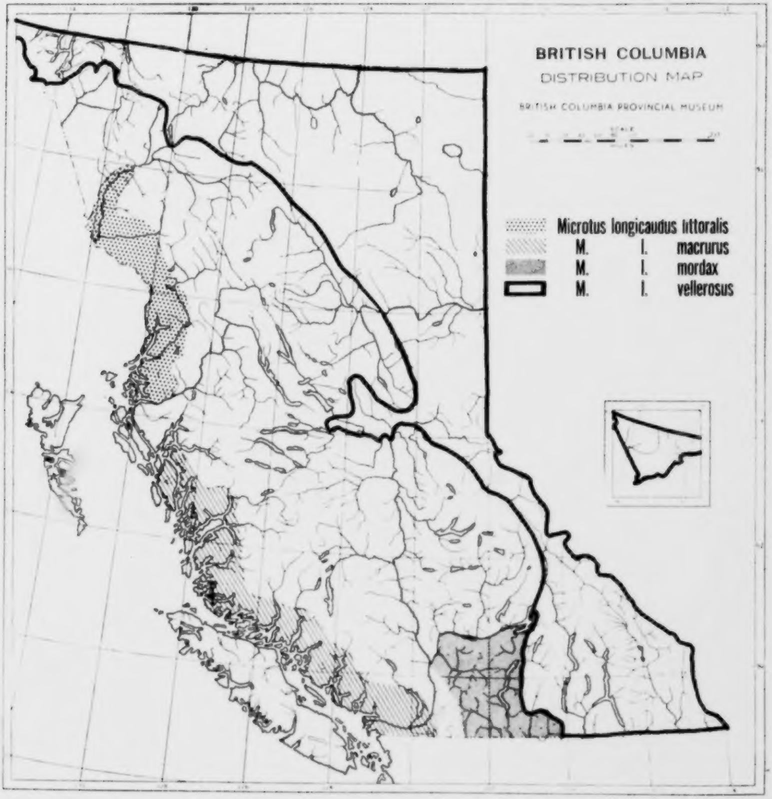
SUBSPECIES

Microtus longicaudus littoralis Swarth

Swarth, Proc. Biol. Soc. Wash. *46*:209, 1933. Type locality, Shakan, Prince of Wales Island, Alaska.

Distinctions.—Differs from *vellerosus* and *macrurus* in being reddish-brown in colour rather than dark grizzled brown. Differs from *vellerosus* in having tail longer; from *macrurus* in smaller size, shorter tail and hind foot.

Measurements. — Ten adults from Prince of Wales Island, Alaska (Swarth, 1933): Total length 189 mm. (172–207); tail 73 mm. (63–80); hind foot 21 mm. (20–22).


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Microtus longicaudus littoralis
M. l. macrurus
M. l. mordax
M. l. vellerosus

Map 33. Distribution of the Long-tailed Vole, *Microtus longicaudus*.

Distribution.—Confined to the extreme north coast, south to Metlakatla. Specimens from Telegraph Creek, Glenora, Flood Glacier.

Microtus longicaudus macrurus Merriam

Merriam, Proc. Acad. Nat. Sci. Phila. *50*:353, 1898. Type locality, Lake Cushman, Olympic Mountains, Mason County, Washington.

Distinctions.—Large size, dark grizzled brownish colour, and large hind foot distinguish this from all other subspecies in the Province.

Measurements.—Five males: Total length 198 mm. (191–202); tail 77 mm. (70–81); hind foot 22.7 mm. (21.5–23.5).

Distribution. — The coastal strip from Vancouver north to Princess Royal Island, from sea-level to 2,000 feet. Does not occur on Vancouver Island or in company with *M. townsendi*. Specific localities on record are Princess Royal Island, Swindle Island, Rainbow Mountains, Hagensborg, King Island, Goose Island, Neckis River, Schooner Passage, Kynoch Inlet, Koeye River, Rivers Inlet, Kingcome Inlet, Loughborough Inlet, Stuart Island, Stillwater, Powell River, North Vancouver, Cultus Lake, Silver Creek near Hope.

Microtus longicaudus mordax (Merriam)

Merriam, North Amer. Fauna *5*:61, 1891. Type locality, east base of Sawtooth Mountains, Baline County, Idaho.

Distinctions.—This is the greyest of all the races, and has the sides grizzled steel grey, the back washed with buff or olive buff over a grizzled background. Underparts whitish, smaller in size and with shorter hind foot than *macrurus*. Similar in size but paler in colour than *vellerosus*.

Measurements.—Four males and five females from Washington (Dalquest, 1948) had measurements as follows: Total length 166 mm.; tail 56 mm.; hind foot 21.7 mm. Ten adult males from Osoyoos-Princeton area: Total length 178 mm. (171–191); tail 65.9 mm. (59–70); hind foot 20 mm. (19–21.5).

Distribution.—Kamloops, Spences Bridge, Blackwater Lake (west of Lillooet), McGillivray Creek, Hedley, Manning Park, Princeton, Stevenson Creek, Fairview–Keremeos summit, Shuswap, Keremeos, Oliver, Anarchist Mountain, Osoyoos, Westbridge, Midway, Cascade.

Remarks.—See Hall and Cockrum (1952) for the application of the name *M. l. halli,* now restricted to the Blue Mountains in Washington.

Microtus longicaudus vellerosus Allen

Allen, Bull. Amer. Mus. Nat. Hist. *12*:7, 1899. Type locality, upper Liard River, British Columbia.

Distinctions.—Differs from *mordax* mainly in darker colour.

Measurements.—Means and extremes of eighteen adults: Total length 180 mm. (167–192); tail 64 mm. (60–70); tail 20 mm. (19–22).

Distribution.—At moderate and high altitudes the entire length of the Rocky Mountains. Westward to Sinkut Mountain near Vanderhoof and to Mount Revelstoke. Localities represented near junction of Stonehouse Creek and Kelsall River, hot springs near junction of Trout and Liard Rivers, south-east end of Muncho Lake, Atlin, Summit Pass, 104 miles north-west of Fort Nelson, head of Sikanni Chief River, Tuchodi Lake, Hazelton, Sinkut Mountain, Assiniboine Pass, Glacier, Tornado Pass, Crowsnest Pass, Fernie, Goatfell, Morrisey, Newgate, Pend d'Oreille, Rossland, Mount Revelstoke, Moose Pass, Yahk, Nine Mile Mountain.

Tundra Vole

Microtus œconomus macfarlani Merriam

Merriam, Proc. Wash. Acad. Sci. 2:24, 1900. Type locality, Fort Anderson, Anderson River, Mackenzie District, Northwest Territories.

Description.—Somewhat similar to *M. p. drummondi* in colour of winter pelage but with tail more heavily haired and with sides and lower surface whitish. Summer pelage with a suffusion of buff on the sides and rump, sometimes throughout, and giving a warmer hue to the pelage. Critical determination can best be made using the skull. This is longer and relatively narrower than in *pennsylvanicus* and has the second upper molar with four simple triangles and without the small fifth column.

Measurements.—Only one specimen available: Total length 154 mm.; tail 37 mm.; hind foot 20 mm.

Habitat.—Sub-tundra vegetation of cotton rush, sedge, grasses, heaths, and flowering plants. Usually in moist locations.

Biology.—Nothing known.

Distribution.—Known only from Stonehouse Creek, 5½ miles west of junction with Kelsall River (*see* Map 32, p. 222).

GENUS ONDATRA—MUSKRATS

Plate 41. Muskrat, *Ondatra zibethica.*

Muskrat

Ondatra zibethica (Linnæus)

Description.—A large, heavy-bodied rat-like mammal; body colour rich brown, overhairs long and glossy, underparts paler, buff to greyish-buff. Hind feet without fur, partially webbed and with the toes margined by short stiff bristles. Tail as long as head and body round at base becoming flattened sideways about 2 inches from body; covered with dark grey scales and scattered hairs.

Habitat.—The muskrat prefers the marshy borders of lakes and rivers, where it feeds upon the sedges, pond weeds, and other plants growing in and near the water. Dead fish, fresh-water mussels, and other animal matter are eaten when available. It sometimes lives away from the water, making burrows in fields, into hay-stacks, or in briar thickets, but these are in general displaced animals unable to find more favourable habitat. In deep-water areas it lives in burrows, but in shallow, sedge-meadow areas where water-levels are stable it may build large mounds of vegetation with the nest in the centre. Beaver lodges are occasionally occupied, along with the beavers.

Biology.—The muskrat is polygamous or monogamous in its mating habits; it breeds from May to August or September, with two or sometimes three litters a year. The gestation period is about twenty-one days; young one to eleven, averaging six.

SUBSPECIES

Ondatra zibethica osoyoosensis (Lord)

Lord, Proc. Zool. Soc. London, p. 97, 1863. Type locality, Osoyoos Lake, British Columbia.

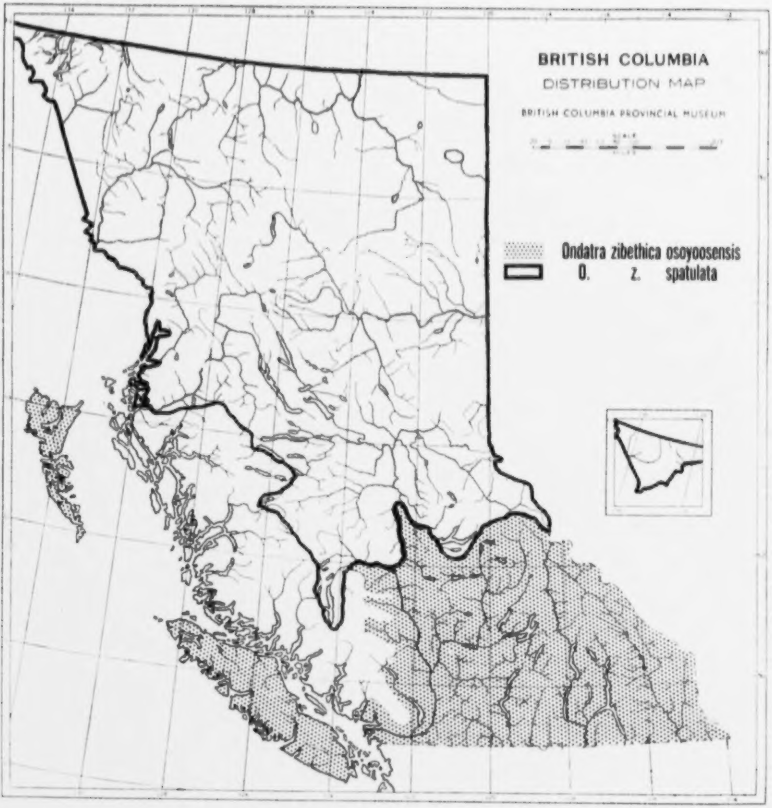
Distinctions.—In fresh pelage darker in colour than *spatulata* with narrower tail.

Measurements.—Ten adults measured: Total length 527 mm. (464–625); tail 244 mm. (202–280); hind foot 76 mm. (65–85).

Distribution.—Southern British Columbia from the Columbia Valley to the coast. North through the Cariboo District. Introduced on Vancouver Island and on Graham Island, Q.C.I. Selected localities are Williams Lake, Masset, Tlell, Kamloops, Golden, Nanaimo, Cowichan Lake, Vancouver, Osoyoos, Cranbrook.

Ondatra zibethica spatulata (Osgood)

Osgood, North Amer. Fauna *19*:36, 1900. Type locality, Lake Marsh, Yukon.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Ondatra zibethica osoyoosensis
O. z. spatulata

Map 34. Distribution of the Muskrat, *Ondatra zibethica*.

Distinctions.—Paler in colour, with a duller, almost drab appearance; tail broader than in *osoyoosensis;* upper tooth row shorter and skull relatively broader than in that race.

Measurements.—Ten adults measured: Total length 526 mm. (500–560); tail 236 mm. (218–252); hind foot 75 mm. (71–78).

Distribution.—The north-eastern part of the Province. Localities of occurrence: Atlin, Tupper Creek, Charlie Lake, Little Prairie, Bear Lake, Tetana Lake, Vanderhoof, Chezacut Lake, Wistaria, Kispiox, Indianpoint Lake (intermediate), Moose River.

FAMILY MURIDÆ—OLD WORLD RATS AND MICE

GENUS RATTUS—OLD WORLD RATS

Roof Rat

Rattus rattus (Linnæus)

Description.—A rat with tail naked and longer than body; large prominent ears; colour sooty black or brown. Brown animals usually have underparts white, black animals have them dark grey.

Habitat.—This is an old world species introduced accidentally by man and still usually found around human habitation. When in contact with the Norway rat, the roof rat usually occupies the upper levels of buildings. Along the southern coast of British Columbia it lives in a completely wild state in second-growth forests or on forest edge.

Biology.—In the wild state it lives on all kinds of vegetation, seeds, nuts, insects, and dead animals. It nests in hollow logs and stumps or occasionally builds nests of twigs, leaves, and bark in the crotch of a tree. Gestation period twenty-one days.

Remarks.—The two subspecies below often occur as distinct populations, but elsewhere completely hybrid populations occur.

SUBSPECIES

Black Rat

Rattus rattus rattus (Linnæus)

Linnæus, Systema Naturæ, 10th ed., p. 61, 1758. Type locality, Upsala, Sweden.

Plate 42. Black Rat, *Rattus rattus*.

Distinctions.—Colour sooty black above, dark blue-grey beneath.

Measurements.—Ten adults measured: Total length 397 mm. (372–430); tail 214 mm. (195–231); hind foot 37 mm. (35–39).

Distribution.—Specimens from Vancouver, North Vancouver, Cowichan Bay, Victoria, Graham Island, Copper Bay on Moresby Island, Kunghit Island.

Alexandrian Rat

Rattus rattus alexandrinus (Geoffroy-Saint-Hilaire)

Geoffroy-Saint-Hilaire, Catal. Mamm. du Mus. Nat. Hist. Paris, p. 192, 1803. Type locality, Alexandria, Egypt.

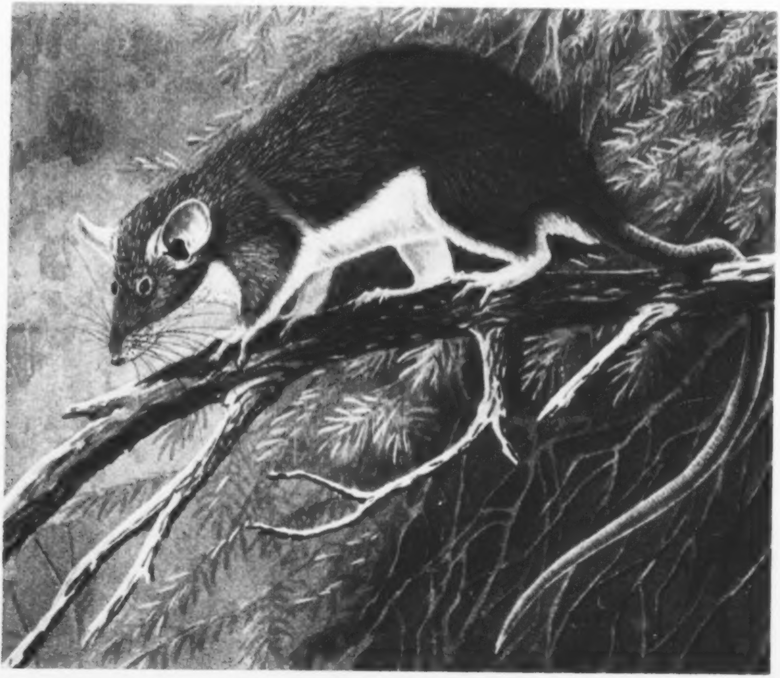


Plate 43. Alexandrian Rat, *Rattus rattus alexandrinus.*

Distinctions.—Colour above grizzled brownish, not unlike that of the Norway rat. Underparts and feet usually white. Distinguishable from the Norway rat by its long slender tail.

Measurements.—Sixteen adults measured: Total length 415 mm. (360–454); tail 222 mm. (200–248); hind foot 37 mm. (35–39).

Distribution. — Scarce in Vancouver and North Vancouver; abundant in the wild on Queen Charlotte Islands where it is in pure stock on Langara Island. Specimens also from New Westminster and from Sandspit, Kunghit Island, Burnaby Island, Q.C.I.

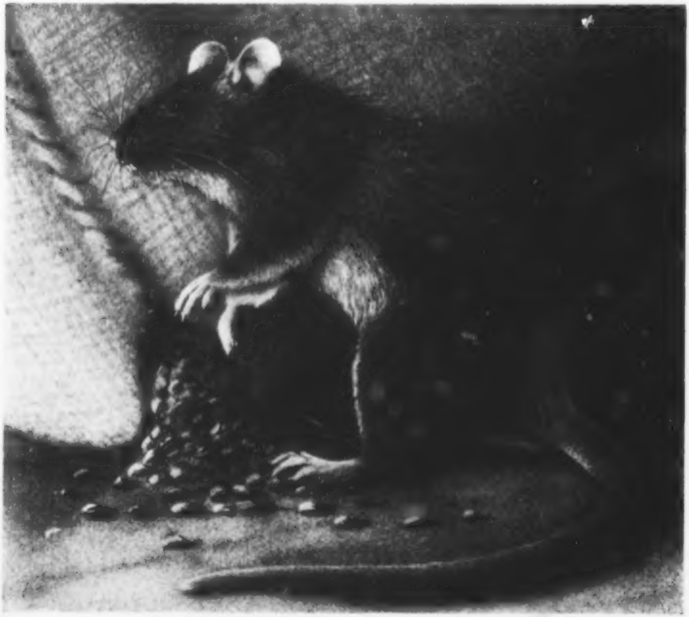


Plate 44. Norway Rat, *Rattus norvegicus*.

Norway Rat

Rattus norvegicus (Berkenhout)

Berkenhout, Outlines of the Natural History of Great Britain *1*:5, 1769. Type locality, England.

Description.—A large rat, brown above, greyish-white beneath; tail shorter than body, hairless, and proportionately shorter and heavier than in the roof rat. Fur coarser than in that species.

Measurements.—Six adults measured: Total length 380 mm. (360–397); tail 180 mm. (168–189); 44 mm. (41–47).

Habitat.—Usually confined to the vicinity of human habitation, straw-stacks, and garbage-dumps, but does occur feral on Lulu Island and Vancouver Island. Here it inhabits the brush margin to the sea-beach on which it forages.

Biology.—Food in the wild consists largely of fruits and animal matter. Young number two to eight and are born throughout the year, but mainly from May to September.

Distribution.—Specimens are known from all the cities and towns along the south-west coast, in the feral state from Lulu Island, Huntingdon, Point Grey, Victoria, Brentwood, Tofino. Not known from the northern interior or Peace River areas.

GENUS MUS—OLD WORLD MICE

Plate 45. House Mouse, *Mus musculus*.

House Mouse

Mus musculus domesticus Rutty

Rutty, Essay Nat. Hist. County Dublin *1*:281, 1772. Type locality, Dublin, Ireland.

Description.—Size small, naked tail about as long as body, ears small but obvious; tail same colour all round, body colour dull, almost yellowish-brown to greyish-brown, underparts paler but not white. Upper incisors have no longitudinal groove down the outer surface.

Measurements.—Seven adult males measured: Total length 172 mm. (168–177); tail 85 mm. (81–90); hind foot 19 mm. (16–21). Three females: 164 mm. (163–165); 76 mm. (72–79); hind foot 18 mm. (17–19).

Habitat.—Usually around human habitation but often lives wild about field borders and near cultivation. Not found in wooded or forested areas.

Biology.—In habitations young are born at all seasons after a gestation period of twenty-one days. Little is known about its behaviour in the wild.

Distribution.—Introduced and now found generally throughout the Province around human habitations. Not known from Queen Charlotte Islands.

FAMILY ZAPODIDÆ—JUMPING MICE

These mice are easily distinguishable from all other small mammals by their yellowish-buff colour, with darker dorsal stripe; white underparts; long hind legs and short forelegs; and very long, very slender tail that has no terminal tuft of hairs. The only other mouse with slight resemblance is the pocket mouse, but it can be identified quite easily by its cheek pounches and sandy to grey body colour.

Jumping mice are hibernators and are active only from May or June until September. Seeds and vegetation form the main part of their diet. All forms favor the thickets of shrub on meadow borders, stream-banks, and similar places, but are sometimes found also in hay meadows and dense stands of wild herbaceous plants. Water is a prime necessity.

Female jumping mice average slightly larger in body measurements than do the males.

For a revision of the genus, *see* Krutzsch (1954).

GENUS ZAPUS—JUMPING MICE

Plate 46. Western Jumping Mouse, *Zapus princeps*.

Meadow Jumping Mouse

Zapus hudsonius (Zimmermann)

Description.—The three species of jumping mice differ little from each other in external appearance. This one differs from *princeps* and *trinotatus* in its smaller size, and from the former by its tendency to have a faint buffy wash over the underparts. More reliable characteristics are to be found in the skull. The cheek teeth are smaller, the entire row measuring 3.7 mm. or less; also the lower margin of the zygoma has a pronounced inward shelf toward the anterior end (Fig. 18 (*b*)).

Over much of the northern part of the Province, *hudsonius* and *princeps* occur together and careful identification is required.

Habitat.—Brushy margins of streams, clearings, and other openings.

Biology.—There is just one litter per year, born in June. Young per litter number from one to six. During August the mouse becomes extremely fat, and by mid-September hibernation has commenced. Activity begins in the spring almost as soon as the new growth of ground vegetation is well started. Food consists of a wide variety of plant material, including seeds.

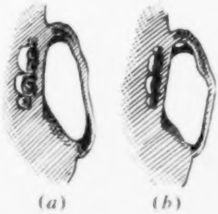


Fig. 18. Ventral view of cheek teeth and zygomatic arch of (*a*) western and northwestern jumping mouse and (*b*) meadow jumping mouse.

SUBSPECIES

Zapus hudsonius alascensis Merriam

Merriam, Proc. Biol. Soc. Wash. *11*:223, 1897. Type locality, Yakutat Bay, Alaska.

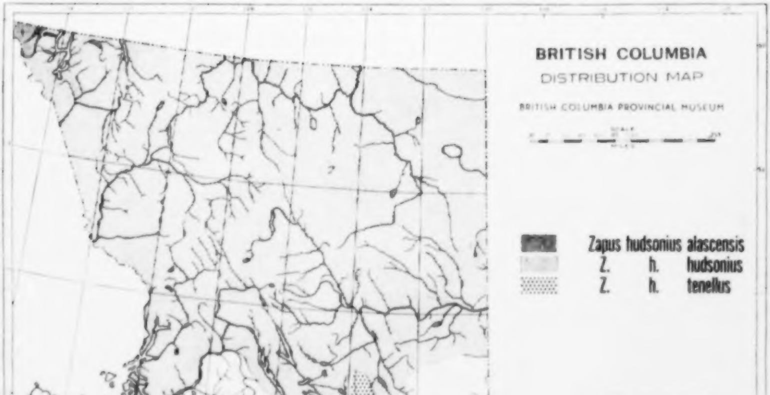
Distinctions.—Larger than *tenellus* with upper parts darker and sides duller and more tawny. From *hudsonius* this race differs in generally paler dorsal colouring, lateral line duller and less distinct.

Measurements.—Average of four specimens (Preble, 1899): Total length 218 mm.; tail 132 mm.; hind foot 21.5 mm.

Distribution.—Known only from Stonehouse Creek, 5½ miles west of its junction with Kelsall River, and west end of Kelsall Lake.

Zapus hudsonius hudsonius (Zimmermann)

Zimmermann, Geogr. Gesch. *2*:350, 1780. Type locality, Hudson Bay.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Zapus hudsonius alascensis
Z. h. hudsonius
Z. h. tenellus

Map 35. Distribution of the Meadow Jumping Mouse, *Zapus hudsonius.*

Distinctions. — Dorsal surface yellowish-fawn to rich ochre flecked with black-tipped hairs. Dorsal dark stripe broad. Underparts white, usually with faint buff patches on the chest. This is most pronounced in the young.

Measurements.—Quimby (1951), gives measurements of sixty-six adults from Minnesota as: Total length, males 214.9 mm., females 219.2 mm.; tail, males 127.5 mm., females 128.2 mm.; hind foot, males and females 30.1 mm.

Distribution.—This subspecies occurs generally in the northern half of the Province east of the Coast Range. Specimen records are from junction of Irons Creek and Liard River, 3 miles west-northwest of junction of Trout and Liard Rivers, 1 mile west of Trutch, Hazelton, Driftwood River, Charlie Lake.

Zapus hudsonius tenellus Merriam

Merriam, Proc. Biol. Soc. Wash. *11*:103, 1897. Type locality, Kamloops, British Columbia.

Distinctions.—Differs from *hudsonius* only in minor characters of colour and skull form. Body colour slightly darker, sides are more olivaceous yellow than buff, dorsal stripe less pronounced, tail darker, as are nose, ears, and the outer sides of the limbs. The skull is flatter in dorsal outline of the frontal region.

Measurements.—Means and extremes of ten adults: Total length 221 mm. (204–243); tail 133 mm. (121–143); hind foot 31 mm. (30–34).

Distribution.—From the Skeena Valley in the north to the Okanagan Valley in central British Columbia. Specimen records from Vanderhoof, Chezacut, Indianpoint Lake, Bowron Lake, Canim Lake, Lac la Hache, Kelly Lake, Lillooet, Douglas Lake, Chu Chua, Ducks, Kamloops, Ashcroft, Nicola Lake, Coldstream (near Vernon), Enderby. At present there is no information on the eastern extremities of the range.

Western Jumping Mouse

Zapus princeps Allen

Description. — Closely similar to *hudsonius* and *trinotatus,* larger than the former and paler than the latter; the differences are detailed under those species. For skull differences from *hudsonius*, *see* Fig. 18.

Habitat.—Similar to that of *hudsonius,* often occurring with that species along the brushy margins of streams, clearings, and other openings.

Biology.—No differences in life-history or behaviour are known, but as two species occur together it seems probable that there are differences of preferred ecologic niche. Swarth (1924) records all females pregnant or nursing after June 30th. Embryos numbered three to five; apparently only one litter per year.

SUBSPECIES

Zapus princeps idahoensis Davis

Davis, Journ. Mammal. *15*:221, 1934. Type locality, 5 miles east of Warm Lake, Valley County, Idaho.

Distinctions.—Similar to *kootenayensis* but body colour more yellowish, the incisive foramina relatively wider, and the tympanic bullæ larger.

Measurements.—Ten adults measured: Total length 238 mm. (230–256); tail 145 mm. (133–159); hind foot 31 mm. (30–32).

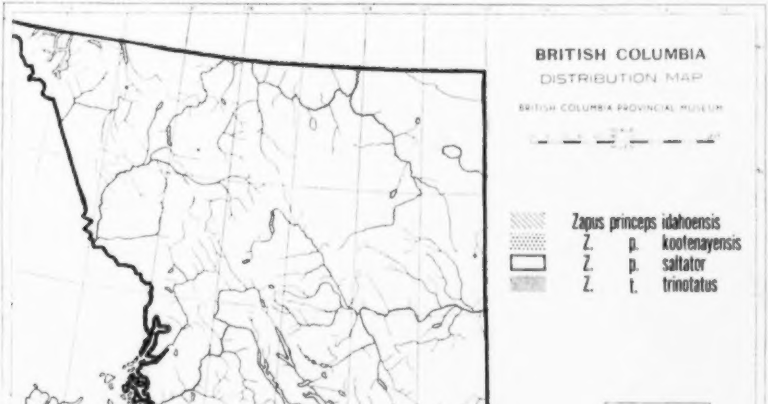
Distribution.—Confined to the Rocky Mountain trench and adjacent mountain-slopes. Specimens from Mount Assiniboine, Paradise Mine, Tornado Pass, Crowsnest Pass, Kootenay Crossing, Invermere, Yahk, Newgate.

Zapus princeps kootenayensis Anderson

Anderson, Ann. Rept. Nat. Mus. Canada for 1931:108, 1932. Type locality, Green Mountain, 10 miles north of Rossland, British Columbia.

Distinctions.—The greyest of the jumping mice in the Province. Dorsal stripe less pronounced than in *idahoensis,* sides greyer and less ochraceous. Incisive foramina narrow, bullæ much smaller than in *idahoensis.*

Measurements.—Twenty adults measured: Total length 229 mm. (215–243); tail 136 mm. (129–147); hind foot 31 mm. (29–33).


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Zapus princeps idahoensis
Z. p. kootenayensis
Z. p. saltator
Z. t. trinotatus

Map 36. Distribution of the Western Jumping Mouse, *Zapus princeps*, and of the Northwestern Jumping Mouse, *Zapus trinotatus*.

Distribution. — This form inhabits the central interior from Rossland to the Hope–Princeton summit and northward at least to the Barkerville area. Specimen records from Rossland, Moyie, Kettle Falls, Bridesville summit, Similkameen, Allison Pass, Monashee Pass.

Zapus princeps saltator Allen

Allen, Bull. Amer. Mus. Nat. Hist. *12*:3, 1899. Type locality, Telegraph Creek, Stikine River, British Columbia.

Distinctions.—Almost as brightly coloured as *trinotatus* but more yellowish and less buff or orange in the hue. Brighter than *kootenayensis.* Dorsal area well defined, underparts white with no trace of buff.

Measurements.—Twenty adults measured: Total length 248 mm. (235–265); tail 150 mm. (140–158); hind foot 33 mm. (31–34).

Distribution.—In suitable habitat throughout the Province from about the 51st parallel northward. Specimens from Atlin, Mile 114 on Alaska Highway north of Summit Pass, Telegraph Creek, Glenora, Charlie Lake, Tupper Creek, Hazelton, McDonald Creek, Wistaria, Burns Lake, Inverness, Port Simpson, Eutsuk Lake, Indianpoint Lake, Moose Pass, Kynoch Inlet, Chezacut Lake, Rainbow Mountains, Stuie, Cariboo Mountain, Hagensborg, Glacier, Knight Inlet, Lillooet.

Northwestern Jumping Mouse

Zapus trinotatus trinotatus Rhoads

Rhoads, Proc. Acad. Nat. Sci. Phila. *47*:421, 1895. Type locality, Lulu Island, Fraser River delta, British Columbia.

Distinctions.—This is the largest, most brightly coloured of the jumping mice. In summer pelage the sides are dark ochraceous buff moderately flecked with black. Black predominates on the dorsal area. Underparts are white, frequently with a buff patch on the chest or a vague buff wash over the entire underparts. Tail dusky brown above, whitish beneath. Autumn pelage paler with less contrast. A pronounced line of bright-orange buff separates the sides from the abdomen. The skull is like that of the *princeps* group but broader and with more arched cranium; as in *princeps* the upper tooth row is 3.8 mm. or more. The teeth are very slightly smaller than in that species.

Measurements.—Twenty adults from the Fraser River delta measured: Total length 238 mm. (223–249); tail 143 mm. (129–155); hind foot 32 mm. (31–35).

Habitat.—The moist meadowland and edges of riparian thickets. Swims strongly and takes to the water readily.

Biology.—Unknown, probably very similar to preceding species.

Distribution. — Only one subspecies, *Z. trinotatus trinotatus* Rhoads, occurs in the Province, and it inhabits the Puget Sound Lowlands of the Fraser River delta area and adjacent regions. Specimen records from Lulu Island, Vancouver, Seymour Mountain, Port Moody, Aldergrove, Huntingdon, Sumas, Brackendale, Alta Lake, Garibaldi Park, Chilliwack, Cultus Lake, Lihumitson Park, Vedder Crossing, Allison Pass (*see* Map 36, p. 243).

Remarks.—Dalquest (1948) has regarded this form as a subspecies of *princeps* but gives no evidence of intergradation between the two. In British Columbia *trinotatus* and *Z. princeps kootenayensis* have been taken together on sub-alpine meadows at Allison Pass without any evidence of intergradation. There is, therefore, no evidence here that the two are conspecific, and pending such evidence we have retained *trinotatus* as a species.

FAMILY ERETHIZONTIDÆ—AMERICAN PORCUPINES

GENUS ERETHIZON—AMERICAN PORCUPINE

Porcupine

Erethizon dorsatum nigrescens Allen

Allen, Bull. Amer. Mus. Nat. Hist. *19*:558, 1903. Type locality, Sheslay River, British Columbia.

Description.—A large blackish rodent, often with long yellow-tipped guard hairs; upper surfaces of the body covered with quills, which, except on rump and tail, are hidden beneath the fur.

Measurements.—Six adults measured: Total length 32 inches (29½–37½); tail 9¼ inches (8¾–9½); hind foot 4 inches (4–4¾). One male weighed 18 pounds.

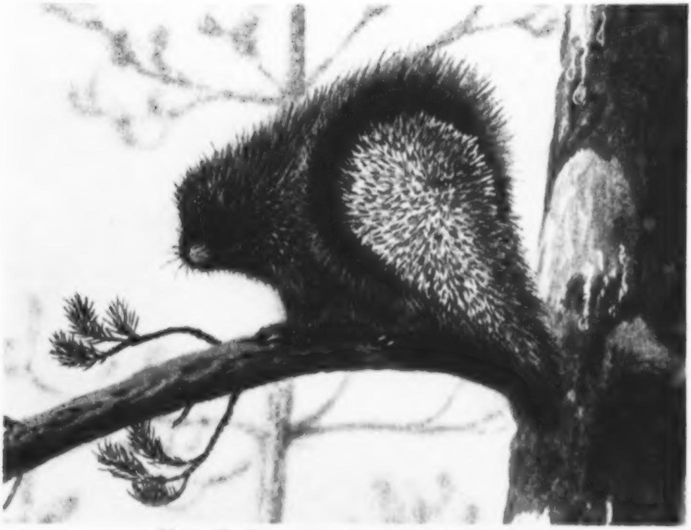


Plate 47. Porcupine, *Erethizon dorsatum.*

Habitat.—The forested areas in all parts of the Province but infrequent in coast forest; most abundant where broken rock, cliffs, and open pine forests occur together.

Biology.—Feeds upon green vegetation and the bark of trees. Favours the bark of pine-trees above all others. Occupies dens in rocky clefts and small caves, in hollow tree-stumps, or at the bases of balsams or spruces that have branches to the ground. Mates in November; gestation is sixteen weeks; young usually one, rarely two, never more.

Distribution.—Occurs throughout the Province in the forested portions, rare in the coast forest and absent from the islands. Specimens seen from Atlin, Telegraph Creek, Bear Lake, Anahim Lake, Tupper Creek, Williams Lake, Chezacut, Bulkley Valley, Quesnel, Eucott Bay on Dean Channel, Neckis River, Rainbow Mountains, Alta Lake, Hat Creek, Okanagan Landing, Monashee Pass, Kootenay Park, Toby Creek near Invermere.

FAMILY CAPROMYIDÆ—NUTRIAS
GENUS MYOCASTER—NUTRIAS

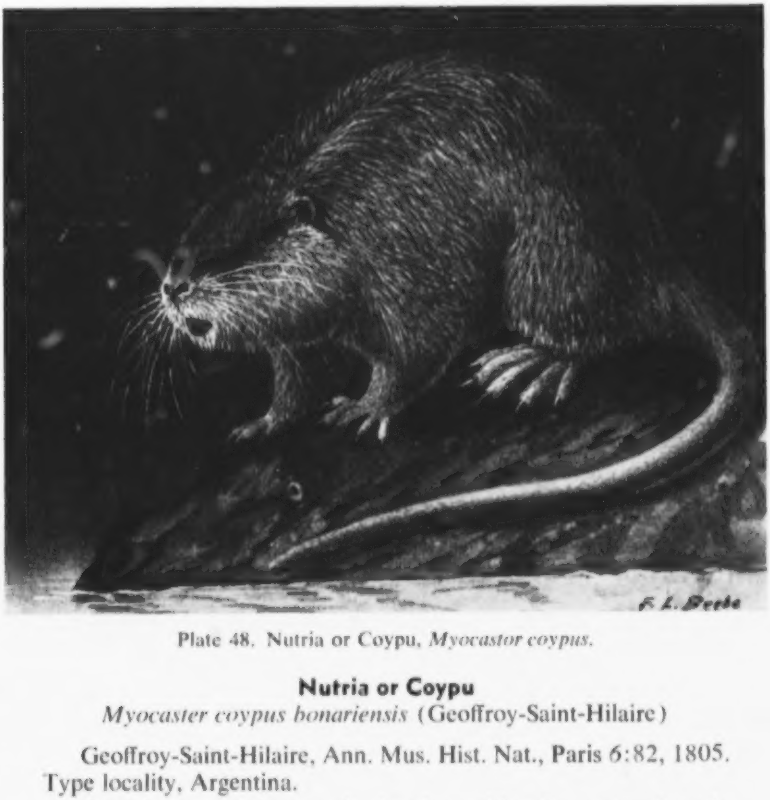


Plate 48. Nutria or Coypu, *Myocastor coypus*.

Nutria or Coypu

Myocaster coypus bonariensis (Geoffroy-Saint-Hilaire)

Geoffroy-Saint-Hilaire, Ann. Mus. Hist. Nat., Paris 6:82, 1805. Type locality, Argentina.

Description.—A beaver-sized rodent with a long, round, scaly tail bearing some coarse hairs. Colour brownish (yellowish-brown flecked with black); underfur sooty. Hind feet webbed.

Measurements.—Total length 30 to 50 inches, of which tail is 12 to 16 inches. Weight up to 18 pounds or slightly more.

Habitat.—The nutria or coypu occurs as an escape from fur-farms. Its normal habitat is along stream-banks in South America. Here it has been taken in the wild in similar habitat.

Biology.—No details are known about its biology in the wild at this latitude.

Distribution.—Specimens from Burnet Creek in Burnaby. Seen wild near Crescent Beach and on Cowichan River; one taken at Courtenay but not preserved.

ORDER CETACEA—WHALES
SUBORDER ODONTOCETI—TOOTHED WHALES

Toothed Whales

Teeth always present after birth, usually numerous, but in some forms, notably the beaked whales, they may be reduced to one or two pairs. There is no baleen. The nostrils open through a single spiracle or blow-hole. In most species this opens through a transversely placed slit on the crown of the head, but in the sperm whale the opening is somewhat S-shaped and near the end of the snout. The halves of the lower jaw are more or less firmly united by a bony symphysis.

FAMILY ZIPHIIDÆ—BEAKED WHALES
GENUS BERARDIUS—BAIRD BEAKED WHALES

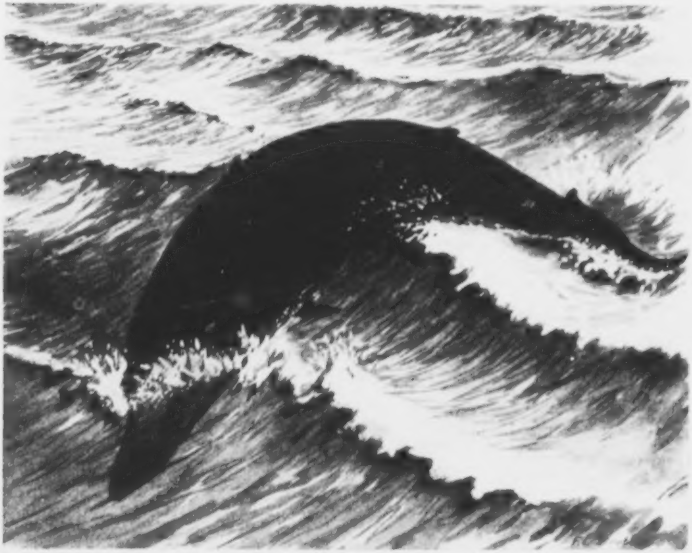


Plate 49. Baird Beaked Whale, *Berardius bairdi.*

Baird Beaked Whale

Berardius bairdi Stejneger

Stejneger, Proc. U.S. Nat. Mus. *6*:75, 1883. Type locality, Bering Island, Bering Sea.

Description.—The largest of the Pacific beaked whales, reaches a length of 40 feet. Colour black on back, some times paler below. " Forehead " rises abruptly from a long, narrow beak. One or two pairs of teeth at the tip of the lower jaw, usually buried in females and young of both sexes. Base of premaxillæ almost symmetrical. Dorsal fin short and placed far back on the body. Throat with two grooves, forming a " V." No notch in hind margin of tail.

Biology.—Nothing is known of the habitat preference or life-history of this species. Feeds on fishes and squid.

Distribution.—Four specimens have been taken commercially off the north-west coast of Vancouver Island between 1932 and 1954. The species is recorded in the north-east Pacific from California to the Bering Sea.

Remarks.—For a review of the group, *see* F. W. True, 1910.

GENUS MESOPLODON—GOOSE-BEAKED WHALES

Stejneger Beaked Whale

Mesoplodon stejnegeri True

True, Proc. U.S. Nat. Mus. *8*:584, 1885. Type locality, Bering Island, Bering Sea.

Description.—A long, slender whale to 17 feet with truncated " beak "-like extension of the head and moderately prominent " forehead." Dorsal fin short and placed far back on body. Colour blackish. Skull with very slender beak, almost symmetrical (bases of the premaxillæ are expanded laterally to form a deep groove between themselves and the expanded bases of the maxillæ). Teeth consist of a single, large, laterally flattened tusk on each side of the lower jaw midway between the tip of jaw and gape. Throat with two grooves in inverted " V " form. No notch in hind margins of flukes.

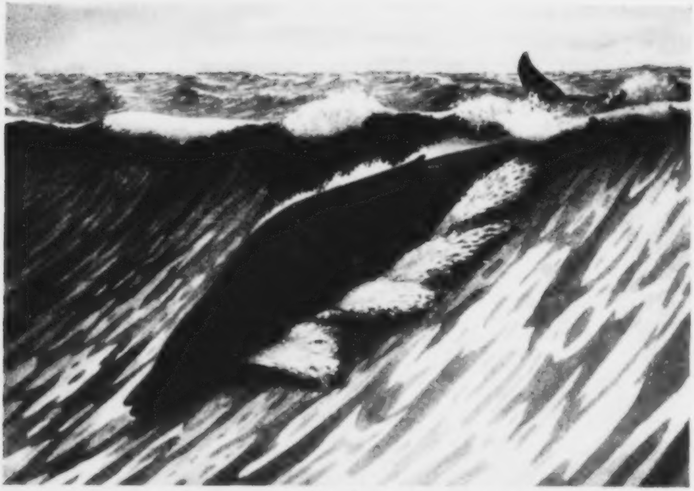


Plate 50. Stejneger Beaked Whale, *Mesoplodon stejnegeri*.

Biology.—Nothing is known of the life-history of this species. Natives of Neah Bay report that it is seen ½ to 1 mile offshore on the salmon-trolling grounds; only one, two, or three whales together. It blows once or twice between soundings (Scheffer and Slipp, 1948).

Distribution.—One specimen known from Port McNeill, Vancouver Island, British Columbia.

GENUS ZIPHIUS—CUVIER WHALES

Cuvier Whale

Ziphius cavirostris Cuvier

Cuvier, Oss. Foss., ed. 2, *5*:353, 1853. Type locality, France.

Description.—Length about 28 feet; colour variable, black, grey or brownish above; head and back as far as dorsal fin sometimes white. Dorsal fin placed two-thirds of way to tail, short and slightly curved. A single pair of teeth near the tip of the lower

Plate 51. Cuvier Whale, *Ziphius cavirostris.*

jaw, sometimes embedded in gum tissue. Skull with large crest formed by the nasals and expanded base of right premaxilla much larger than left parietals. Throat with two grooves in inverted " V " form.

Biology.—Nothing known.

Distribution.—Four specimens are known—skulls picked up on the beach near Cape Scott, Vancouver Island, Victoria, and near Bella Bella. A complete specimen was examined at Jordan River, Vancouver Island, in January, 1954. Cosmopolitan in distribution. Distribution on the Pacific coast ranges from California to Alaska.

FAMILY PHYSETERIDÆ—SPERM WHALES

GENUS PHYSETER—SPERM WHALES

Sperm Whale

Physeter catodon Linnæus

Linnæus, Syst. Nat., ed. 10, *1*:76, 1758. Type locality, Kairston, Orkney Islands.

Description.—The largest of the toothed whales, males rarely longer than 60 feet, females rarely longer than 38 feet. Head roughly rectangular in side view with a blunt snout; dorsal fin replaced by a low hump followed by several lesser humps; a single sigmoid blow-hole located near tip of snout on the left side emits a "spout" directed obliquely forward. Twenty to thirty pairs of strong conical teeth set in the lower jaw. Colour slate grey to blackish above, often paler on underside of head and on lower jaw.

Habitat.—The oceans of the world except those of high latitudes, where only occasional aged animals occur.

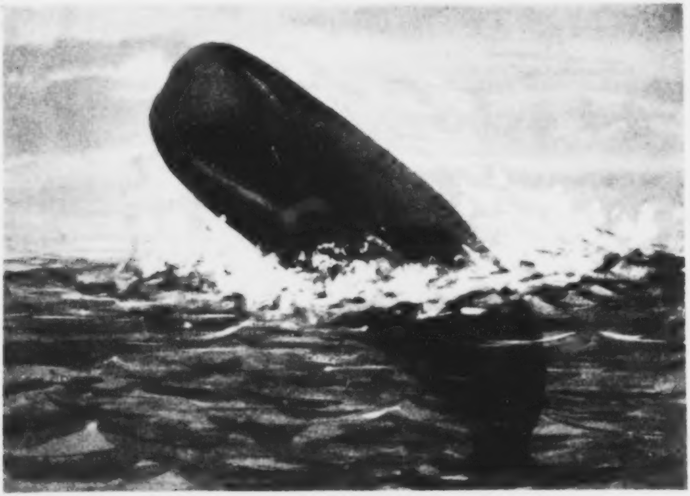


Plate 52. Sperm Whale, *Physeter catodon*.

Biology.—Polygamous; age at first breeding believed to be 2 to 3 years; gestation believed to be about sixteen months. Young single, 14 to 15 feet long at birth. Breeding schools are confined to tropical and sub-tropical seas. In British Columbia waters it feeds chiefly on squid and ragfish, also on skate, dogfish, and rockfish. Dives to great depths and may remain submerged as long as one hour.

Distribution.—More than 3,500 sperm whales have been taken commercially in British Columbia since 1920. The catch is made during the summer months and consists mainly of bachelor bulls about 40 feet in length.

Family DELPHINIDÆ—Porpoises, Dolphins, and Blackfish

Genus STENELLA—Long-beaked Dolphins

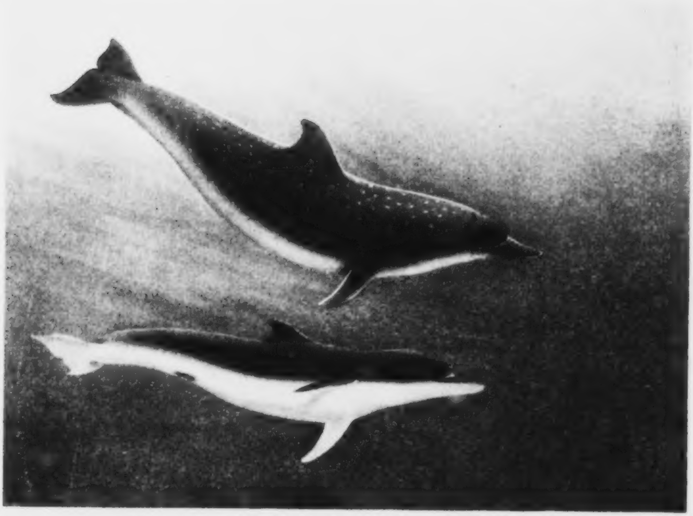


Plate 53. Long-beaked Dolphin, *Stenella styx.*

Long-beaked Dolphin

Stenella styx (Gray)

Gray, Zool. Voyage H.M.S. Erebus and Terror *1*, Mammalia (Pt. 3):39, 1846. Type locality unknown.

Description.—Length to about 7 feet. Colour blackish above, white below. A broad black streak extends backwards from the eye, curving downwards and widening out on each side of the vent. A small incomplete subsidiary branch joins the broad streak near the flipper insertion. From a black circle around the eye, two black lines extend obliquely backwards to the insertion of the flipper. Long slender beak, " forehead " not much elevated. Dorsal fin moderate, slightly curved backwards. Teeth strong and sharp pointed, number forty-six in each side of upper jaw of only specimen examined. Beak of skull long and slender, 9 inches in length from orbital notch.

Distribution.—Known from one specimen, a skull found on the beach on Tahsis Canal, Vancouver Island, British Columbia.

GENUS DELPHINUS—DOLPHINS

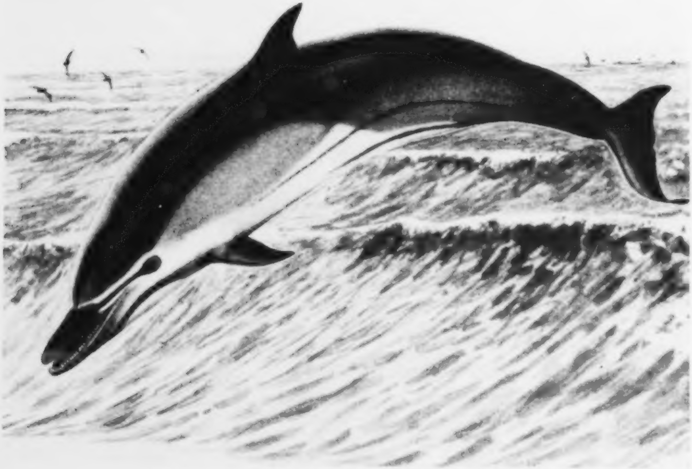


Plate 54. Baird Dolphin, *Delphinus bairdi.*

Baird Dolphin

Delphinus bairdi Dall

Dall, Proc. Calif. Acad. Sci. 5:12, 1873. Type locality, Arquello Point, Santa Barbara County, California.

Description.—Length from 6 to 8½ feet. Colour dark above with a suffusion of yellow on the sides interrupted by varied bands of black, yellow, and white. White below. Beak about 6 inches long tapering to a low, sloped forehead. Forehead and beak clearly delimited by a deep V-shaped groove. Dorsal fin, flippers, and flukes moderate in size. Teeth slender, sharply pointed and recurved, number forty to fifty on each side in each jaw. "Beak" of skull about 7 inches in length from orbital notch.

Habitat.—Littoral and pelagic waters of the warmer parts of the Pacific Ocean.

Biology. — Usually travels in large schools and is one of the fastest swimming of the smaller cetaceans. Often accompanies ships for considerable distances. Food largely small fishes captured in direct pursuit. No data on number of young or gestation period at these latitudes.

Distribution.—Known in British Columbia from one specimen, an animal in the round found dead at Victoria. Reported occasionally from pelagic waters.

GENUS LAGENORHYNCHUS—STRIPED DOLPHINS, WHITE-SIDED DOLPHINS

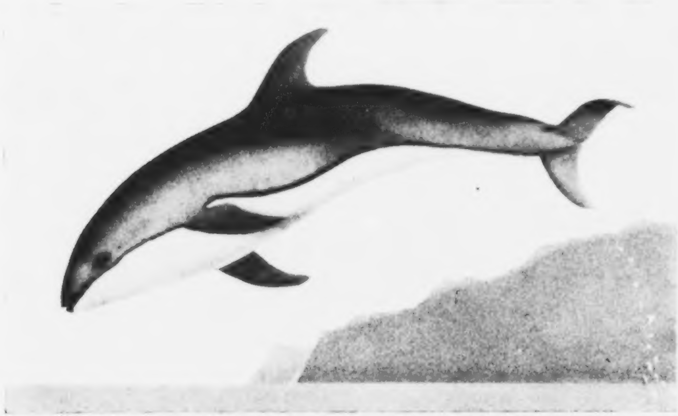


Plate 55. Pacific Striped Dolphin, *Lagenorhynchus obliquidens.*

Pacific Striped Dolphin

Lagenorhynchus obliquidens Gill

Gill, Proc. Acad. Nat. Sci. Phila., *17*:177, 1865. Type locality, near San Francisco, California.

Description.—Total length when full grown about 7½ feet. Slender and graceful, rostrum extended in a short beak. Dorsal fin long and slender, curved backwards at the tip. General colour black with one elongate white or grey stripe on each side posteriorly. Underparts white. Teeth curved and sharp pointed, longest ¾ inch in length, about forty-four to forty-six in each jaw.

Habitat.—The sub-tropical waters of the north Pacific.

Biology.—There is no information from this latitude.

Distribution.—Occurs regularly in small numbers in the Straits of Georgia and Juan de Fuca. One sight record at close range in Goletas Channel near Port Hardy.

GENUS GRAMPUS—KILLER WHALES

Pacific Killer Whale or "Blackfish"

Grampus rectipinna (Cope)

Cope, Proc. Acad. Nat. Sci. Phila. *21*:22, 1869. Type locality, coast of California.

Description.—Size large, length of males to 26 feet or more, females to 20 feet. Colour generally black with a trident-shaped white area on the anal region, abdomen, chest and throat white, a white or yellow spot behind the dorsal fin and another over the eye. Head large and strong, has ten to thirteen pairs of conical teeth in upper and lower jaw. Pectoral flippers stout and broad, dorsal fin very tall, up to 6 feet in males, 2½ feet in females, sometimes flaccid at the tip. Single blow-hole on crown of head as transverse slit.

Habitat. — Usually the shallow shore waters, enters narrow inlets, bays, and harbours.

Biology.—Little is known of the breeding season; one young is born annually. Has a voracious appetite and has been seen chasing seals and sea lions on to the beach, known to eat many

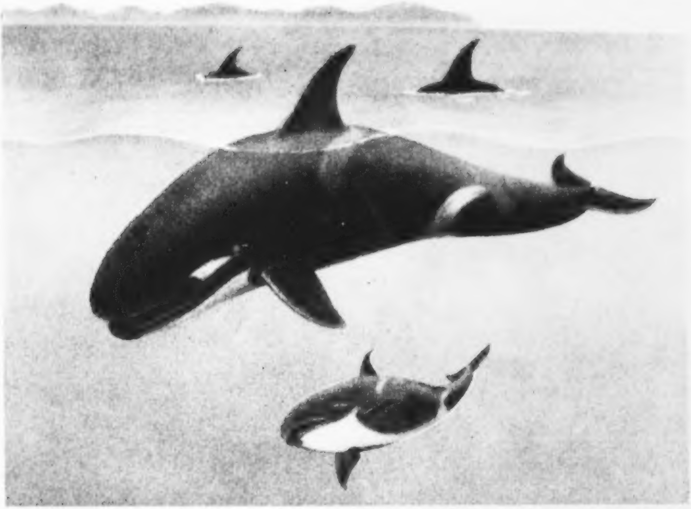


Plate 56. Pacific Killer Whale or "Blackfish," *Grampus rectipinna.*

kinds of fish, also sea birds, porpoise, squid, and other larger marine forms. Is said to attack the larger whales and to eat out their tongues as well as tearing and damaging them generally. Usually travels in groups of from 2 to 100 or more.

Distribution.—The entire coast-line; specimens from Bella Bella, Victoria, Estevan Point, Wiah Point (Q.C.I.), Read Island, Quadra Island, Cowichan Bay.

GENUS GLOBICEPHALA—PILOT WHALES

Scammon Blackfish—"Squarehead"

Globicephala scammoni Cope

Cope, Proc. Acad. Nat. Sci. Phila. *21*:21, 1869. Type locality, coast of lower California in latitude 31°.

Description.—Length to 28 feet. Black body, frequently with white stripe on undersurface, expanding into a heart-shaped figure on throat. Head with prominent bulging "forehead" and short rim-like beak. Pectoral fins long and slender; dorsal fin low but with a broad base, rounded at tip, deeply concave in posterior margin. Teeth eight to ten in lower jaw, ten to twelve in upper.

Habitat.—Cosmopolitan in distribution, but most common in boreal waters.

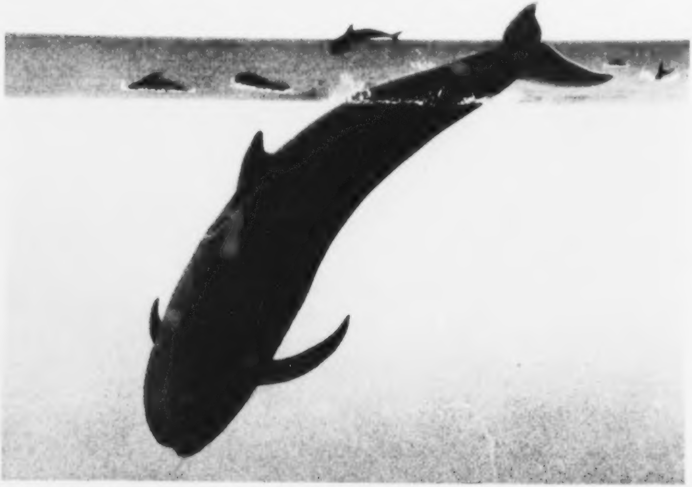


Plate 57. Scammon Blackfish or "Squarehead," *Globicephala scammoni.*

Biology.—Food consists almost entirely of squid and small fish. Travels in large schools which frequently become stranded.

Distribution.—Known in British Columbia only from reports of large schools seen on the sperm whale grounds of Queen Charlotte Islands and in Hecate Strait; no specimens have been preserved from British Columbia waters.

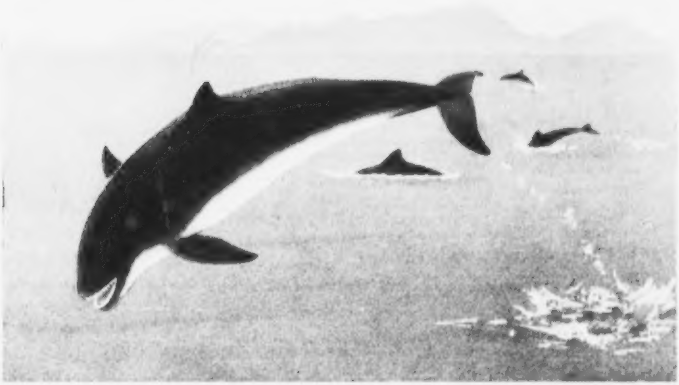


Plate 58. Harbour Porpoise, *Phocæna vomerina.*

Harbour Porpoise

Phocæna vomerina Gill

Gill, Proc. Acad. Nat. Sci. Phila. *17*:178, 1865. Type locality, Puget Sound, Washington.

Description.—The smallest of the toothed whales, it reaches a maximum length of about 6 feet. Upper surface dark grey to almost black, belly paler, no white areas on sides. A dark line, split for part of its length, extends from below the corner of the mouth to the flipper insertion. Dorsal fin moderate in length, teeth twenty-four to twenty-five on each side, no beak, most of the teeth spatulate at the tip, not pointed.

Habitat.—Frequent bays, harbours, inshore waters, and up to 20 miles offshore.

Biology.—Single young are born at a length of about 2 feet. Gestation 183 days, mating in July to October. Food largely soft-spined fishes and squid. Not schooling, usually two to four together.

Distribution.—Occurs along the entire coast-line at all times of the year. Specimens from Nootka Island, Queen Charlotte City, Victoria, Hardy Bay, Hernando Island, Little Qualicum, Vancouver.

GENUS PHOCÆNOIDES—DALL PORPOISE

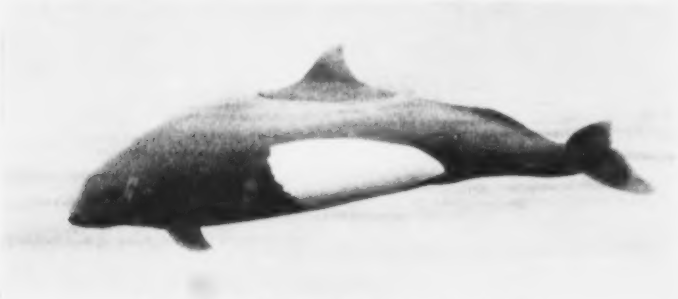


Plate 59. Dall Porpoise, *Phocænoides dalli.*

Dall Porpoise

Phocænoides dalli (True)

True, Proc. U.S. Nat. Mus. *8*:95, 1885. Type locality, strait west of Adakh Island, Aleutian Islands, Alaska.

Description.—Length about 6 feet, colour dull blue-black on back, contrasting with a large white patch on the belly and flanks. A distinct hump in the dorsal contour just forward of the flukes. Caudal peduncle extended above and below into strong keel-like ridges. A short beak, lower jaw projecting slightly beyond upper; dorsal fin short, curved backwards only slightly; teeth very small and weak, most of them expanded slightly at the tip, twenty-three above, twenty-four below on each side; do not normally project out of the gum tissue. Gums horny with a series of horny points, one between each pair of teeth. Beak from orbital notch about 5 inches in adults.

Habitat.—Coastal and offshore waters. Rarely enters the Strait of Georgia.

Biology.—Young rarely seen with the groups on our coasts. Feeds largely on herring and other small fish. An extremely rapid swimmer capable of speeds to at least 12 knots. Travel in schools of six to twenty or more. Delights to accompany moving vessels. Appear in Hecate Strait in late June and remain until October at least.

Distribution.—The most abundant porpoise north of Vancouver Island. Specimens from Nigei Island, Laredo Channel, Goose Island, Goletas Channel, west coast of Vancouver Island, Masset.

SUBORDER MYSTICETI—BALEEN WHALES

Mostly large whales, toothless after birth. The upper jaw is provided down each side with a close-packed series of horny plates (baleen or " whalebone ") suspended side by side from the outer part of the palate. Each plate is fringed into coarse " hairs " along its inner margin. The matted hairs of the closely adjacent plates provide a mechanism for screening the water from the small fish or plankton that constitute the food of these whales. The bones of the lower jaw are joined at the tip by a flexible membraneous union. The nostrils open on the crown of the head in a pair of longitudinal slits. In all species the lower jaw is longer than the upper. Most species have the throat and chest deeply grooved longitudinally.

In general, young are produced not more frequently than every second year (Macintosh, 1938). Gestation is about a year in most species. Females are slightly larger than males.

FAMILY RHACHIANECTIDÆ—GRAY WHALES

GENUS ESCHRICHTIUS

Gray Whale

Eschrichtius glaucus (Cope)

Cope, Proc. Acad. Nat. Sci. Phila. *20*:160, 1868. Type locality, Monterey Bay, California (Schevill, 1952).

Description.—Slender but rather ungainly with blunt head, rounded foreflippers. Length to 45 feet, a dorsal hump followed by several lesser humps; colour mottled grey or blackish. Baleen short, longest plates about 16 inches, coarse, 138 to 174 plates each side with coarse fringe, yellow in colour. Throat with two to four grooves up to 4 feet in length.

Measurements.—A weight of 31 tons is given for a 44-foot individual.

Biology.—This is a strongly migratory species, passing up and down the west coast twice a year en route between its winter breeding-grounds in the lagoons along the coast of lower California and Mexico and its summer feeding-ground in the Gulf of Alaska

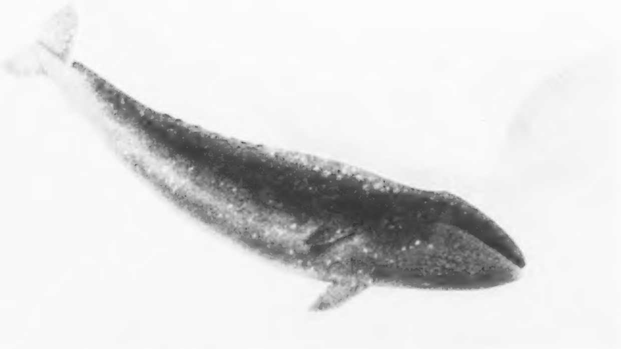


Plate 60. Gray Whale, *Eschrichtius glaucus*.

and Bering Sea. Young are single, about 14 feet long at birth. Gestation is thought to be about twelve months, and birth takes place mostly in December and January. The only existing gray whales are found on the east and west coasts of the north Pacific.

Distribution.—Passes along the coast of British Columbia on migration. Specimen records from the waters adjacent to Quatsino Sound, Vancouver Island.

FAMILY BALÆNOPTERIDÆ—FINBACKS AND BLUE WHALES

GENUS BALÆNOPTERA—FINBACKS

Common Finback

Balænoptera physalus (Linnæus)

Linnæus, Syst. Nat., ed. 10, *1*:75, 1758. Type locality, Spitzbergen Seas.

Description.—A very large whale of slender and stream-lined body form. Recorded lengths in the northern hemisphere are seldom greater than 70 feet, but grows to lengths of more than 80 feet in the southern hemisphere. Head flat, pointed, and about one-fourth of total length. Colour blackish above, white below, asymmetrical with more white on right side. Distinctive fin with concave hind margin. Numerous throat grooves extend backwards to behind the umbilicus.

Measurements.—A weight of 52 tons is recorded for a 68-foot individual (Mackintosh, 1938).

Biology.—An extremely rapid swimmer, often playing about vessels; spout quick, high, and columnar. Does not raise its flukes out of the water when sounding. Feeds almost exclusively on euphausids along the British Columbia coast during the summer months. Breeds during winter months in the northern hemisphere. Gestation believed to be about eleven and one-half months; usually a single young at birth, with a length of about 20 feet.

Distribution.—Along the outer coast of the Province. Enters the northern straits upon occasion. The most common species in whale-catches along the west coast of Vancouver Island.

Sei or Pollack Whale

Balænoptera borealis Lesson

Lesson, Hist. Nat. Gen. et Partic, Mamm. et Oisseaux, *1*:342, 1828. Type locality, Lubeck Bay, Germany.

Description.—A long slender whale, adults 40 to 50 feet in length. Body black above, shading to blue-grey with some white areas beneath. Skin often presents a " galvanized " appearance caused by light-coloured patches; dorsal fin relatively larger than in the finback, strongly curved, and situated three-quarters of the length from the head. Forty to sixty longitudinal furrows on throat and chest terminating anterior to the umbilicus. Baleen in about 340 plates, black except for a few white plates at the anterior end; fine, white, baleen bristles.

Measurements.—A weight of about 22 tons is given for a 48-foot Sei whale caught off the west coast of Norway (Bjarnason, Ingi and Per Lingaas, 1954).

Biology.—This whale tends to frequent the temperate and subtropical waters. It pairs mainly in the midwinter months with the young arriving a year later; single young are the rule; length at birth about 16 feet and are suckled for about five months. Food consists mostly of copepods on the British Columbia coast. Some euphausids and probably some small fish are also eaten.

Distribution.—Occurs in large numbers off the British Columbia coast each summer. A few are taken each year by commercial whaling-vessels.

Sharp-nosed Finner, Mink or Pike Whale

Balænoptera acutorostrata Lacepede

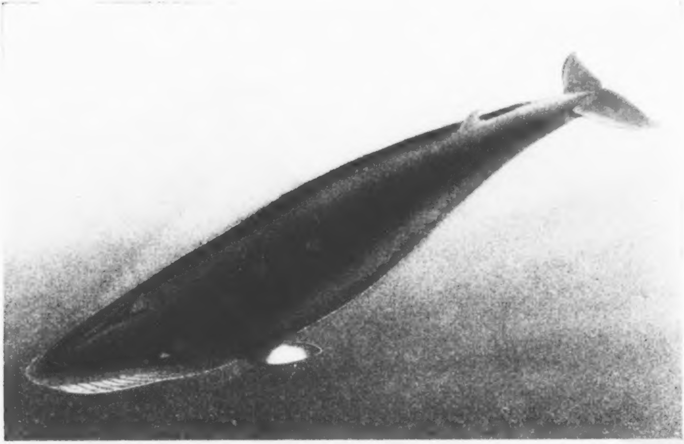


Plate 61. Sharp-nosed Finner, Mink or Pike Whale, *Balænoptera acutorostrata.*

Lacepede, Hist. Nat. des Cetacies; table des ordres, genres, et espèces, p. XXXVII, 1804. Type locality, European seas.

Description.—A slender, torpedo-shaped small whale reaching a length of 24 feet. This is the smallest of the baleen whales. Colour blackish, dorsally white beneath. A distinctive mark is the white band across each foreflipper. A low, curved dorsal fin is situated behind the mid-point of the back. The throat bears numerous longitudinal folds that extend back to the umbilicus. Baleen short (longest blades about 5 inches), white or cream; about 320 to 330 plates.

Measurements.—A weight of 1.2 tons is given for a young individual 16 feet in length (Macintosh, 1942).

Biology.—This is a common whale in the shallower coastal waters. Here it follows the schools of sand lance, herring, anchovies, and other small fish, upon which it feeds.

Distribution.—Inhabits the entire coast-line but does not enter the deep inlets nor the eastern parts of Georgia Strait. Specimens from Sointula, Shushartie, Sooke.

GENUS SIBBALDUS—BLUE WHALE

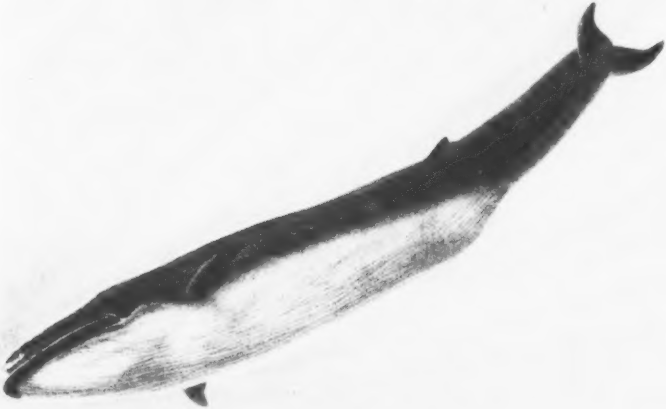


Plate 62. Sulphur-bottom or Blue Whale, *Sibbaldus musculus.*

Sulphur-bottom or Blue Whale

Sibbaldus musculus (Linnæus)

Linnæus, Syst. Nat., 10th ed., *1*:76, 1758. Type locality, Firth of Forth, Scotland.

Description.—The largest of the whales, reaches a length of more than 100 feet, but lengths of more than 80 feet are seldom recorded from the northern Pacific. Colour slate grey to mottled bluish-grey, underparts paler, and quite variable in colour, sometimes mottled. Dorsal fin small and located relatively closer to the tail than in other members of the family. Baleen short, longest about 3 feet, black; an average of 320 plates; throat with an average of ninety longitudinal furrows, the median ones extending back to the umbilicus.

Measurements.—A weight of 120 tons is recorded for an 89-foot individual (Macintosh, 1942).

Biology.—An active, powerful whale, spout tall and columnar. Matures apparently at 3 to 7 years. Breeding and pairing occur during the winter months, and the gestation period is about ten to eleven months. A single young is usual. Length at birth is about 23 feet (Macintosh and Wheeler, 1929). Feeds almost exclusively on euphausids along the coast of British Columbia during the summer months.

Distribution.—Usually found offshore and seldom in concentrations of more than two or three individuals. Very few blue whales enter the commercial whale-catches on this coast.

GENUS MEGAPTERA—HUMPBACK WHALES

Humpback Whale

Megaptera novæangliæ (Borowski)

Borowski, Gemeimnuzzige Naturgeschichte des Thierreichs 2 (Pt. 1):21, 1781. Type locality, coast of New England.

Description.—A large, stout-bodied whale reaching 50 feet in length. The dorsal fin is slightly behind the mid-body and appears as a low hump. Pectoral fins very long and narrow, to 8 feet in length, knobbed along forward edge. Flukes broad and irregular along posterior edge. Body colour variable, from entirely black and black dorsally with varying amounts of white. About twenty-six grooves on throat. Baleen short (to 3½ feet), coarse, black, about 325 plates on each side. Spout arises as twin columns that unite and expand into a " mushroom " up to 20 feet in height. Sometimes jumps clear of the water or rolls on the surface with one flipper splashing vigorously; flukes are clear of water when animal sounds.

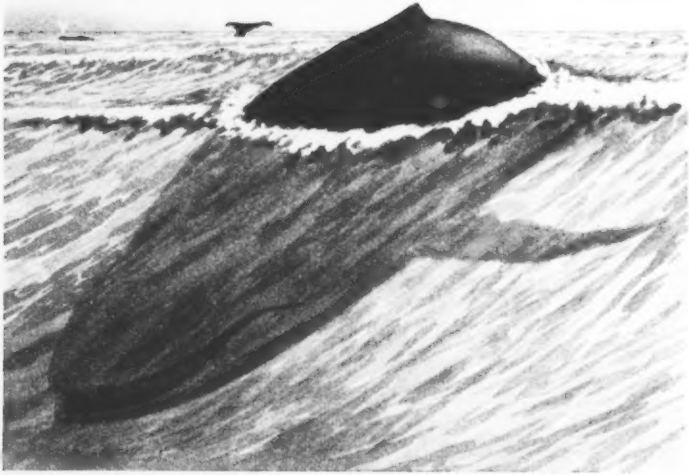


Plate 63. Humpback Whale, *Megaptera novæangliæ.*

Measurements.—A weight of 32 tons is recorded for a 45-foot individual (Macintosh, 1942).

Biology.—This is migratory species that frequently enters the partially enclosed straits and inlets. Breeds mainly during winter months. Sometimes humpbacks are found simultaneously pregnant and lactating. It breeds on the average of twice every three years and usually one young is born, with an average length of about 16 feet. Along our coasts the food consists almost exclusively of euphausids. Small fishes are probably taken when this " red feed " is not abundant.

Distribution.—Found mainly along open coastal waters, sometimes enters the Strait of Georgia, mainly during summer months. A few humpbacks winter along the coast of British Columbia, but most of the population returns to low latitudes for giving birth and pairing.

FAMILY BALÆNIDÆ—RIGHT WHALES AND BOWHEADS

GENUS EUBALÆNA—RIGHT WHALES

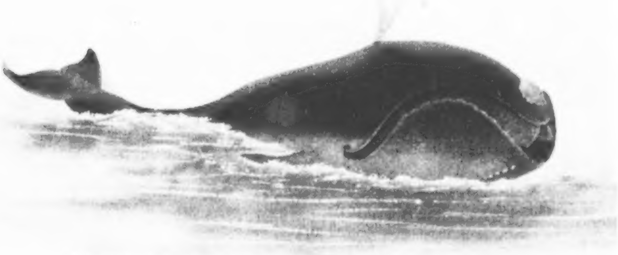


Plate 64. Pacific Right Whale, *Eubalæna sieboldi*.

Pacific Right Whale

Eubalæna sieboldi (Gray)

Gray, Ann. Mag. Nat. Hist., Series 3, *14*:349, 1864. Type locality, coast of Japan and north-west coast of North America.

Description.—One of the largest whales, reaching a length of about 50 feet. Head large, bowed dorsally; a rough protuberance at tip of upper jaw and warty elevations on lips and head; no dorsal fin, throat without longitudinal folds; colour black above; may have irregular white patches below. Baleen 5 to 7 feet in length, slender, black, with fine black bristles. The spout is paired, the two streams of vapour diverging as they rise.

Biology.—Little known, was once a common species but now very rare and protected by international agreement. A single young is born at a time after a gestation of about a year; mating is apparently in the early spring.

Distribution.—Has been taken on occasion at whaling-stations located on the Queen Charlotte Islands and along the west coast of Vancouver Island. Usually found near the ice edge in high latitudes. Recorded in north-east Pacific from California to the Arctic Ocean.

KEY TO THE FLESH-EATERS (ORDER CARNIVORA AND ORDER PINNIPEDIA)

1. Fore and hind limbs flipper-like, tail shorter than hind foot; none of the cheek teeth with more than two roots. Seals, sea-lions, etc. *Order Pinnipedia.*

2. Flippers clothed in hair; claws terminal; upper incisors pointed and without a groove on the cutting surface (Fig. 19 (*a*)); nostrils dorsal; testes internal; no external ear pinna. True seals. *Family Phocidæ.*

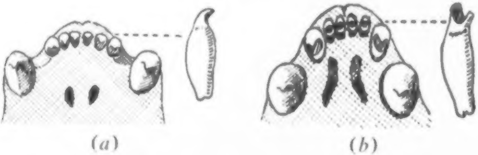


Fig. 19. Front teeth on upper jaw of (*a*) harbour seal and (*b*) fur-seal.

3. Size very large; adult males with short trunk on nose; cheek teeth simple and peg-like, upper incisors four, lower two. Elephant seal. *Mirounga angustirostris.*

3′. Size smaller; no trunk on nose; cheek teeth with two roots and not peg-like; upper incisors six, lower six. Harbour seal. *Phoca vitulina.*

2′. Flippers naked; claws subterminal; upper incisors with a groove from side to side across cutting surface (Fig. 19 (*b*)); small finger-like ear pinna; nostrils terminal; testes scrotal. Eared seals. *Family Otariidæ.*

4. Thick covering of soft fur, cheek teeth 6/6; external ear 2 inches or more in length. Fur seal. *Callorhinus ursinus cynocephalus.*

4′. Fur consisting of short coat of rather coarse hair; cheek teeth 5/5; external ear about 1 inch in length.

5. Cheek teeth in unbroken row (Fig. 20 (*a*)). California sea-lion. *Zalophus californianus.*

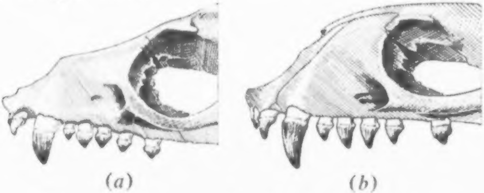


Fig. 20. Upper teeth of (*a*) California sea-lion and (*b*) northern sea-lion to show difference in spacing of last two teeth.

5′. Cheek teeth with gap between second last and last upper tooth. (Fig. 20 (*b*)). Northern sea lion. *Eumetopias jubata.*

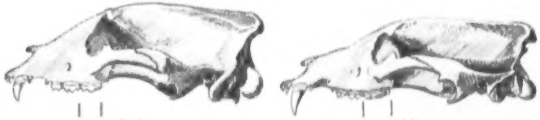
1′. Fore and hind limbs not flipper-like; at least two of the upper cheek teeth on each side with three roots.

6. Five toes on hind foot; carnassial teeth usually not sharp-pointed, cheek teeth instead usually more or less flattened; if carnassials sharp, then cheek teeth 4/5, 5/5, or 5/6.

7. Size large, adult skull more than 7⅞ inches in length, tail shorter than hind foot. Bears.

8. Last upper molar with crown more than 1¼ inches in length (Fig. 21 (*b*)); longest front claws more than 2⅜ inches in length. Grizzly bear, *Ursus arctos.*

8′. Last upper molar with crown less than 1¼ inches in length (Fig. 21 (*a*)); longest front claw less than 2⅜ inches in length. Black bear. *Euarctos americanus.*



(*a*) (*b*)

Fig. 21. Upper tooth rows of (*a*) black bear and (*b*) grizzly to show difference in relative size of last upper molar tooth.

7′. Size smaller, adult skull less than 7⅞ inches, tail longer than hind foot.

9. Tail with conspicuous black rings; forty teeth. Raccoon. *Procyon lotor.*

9′. Tail without black rings; less than forty teeth.

10. Colour of upper parts black and white or black and white on head with silvery back and sides; thirty-four teeth, first upper molar always with well-developed internal cusp.

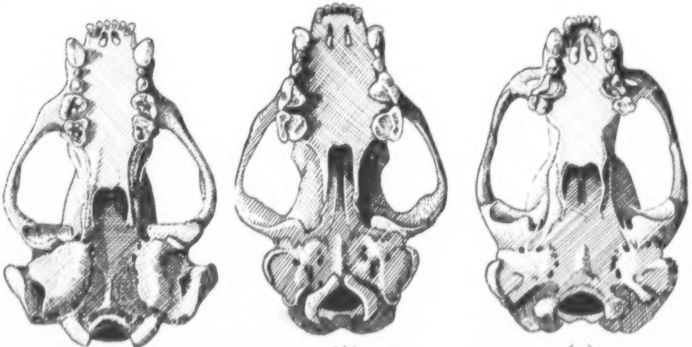
11. Colour black and white on head, silvery on sides and back; a single white stripe starting on head and extending a varying distance down back. Palate projecting behind basilar molars for a distance of more than length of first upper molar (Fig. 22 (*a*)). Badger. *Taxidea taxus.*

11′. Colour black and white throughout; basilar length less than 3⅛ inches. Palate not projecting behind molars for a distance more than length of first upper molar (Fig. 22 (*b*)).

12. Back with two white stripes; length of upper tooth rows greater than $\frac{15}{16}$ inch. Striped skunk. *Mephitis hudsonica.*

12′. Back with four or more lines of broken white stripes; length of upper tooth row less than $\frac{15}{16}$ inch. Spotted skunk. *Spilogale gracilis.*

10′. Colour of upper parts usually some shade of brown; thirty-eight to thirty-two teeth, but if thirty-four, first upper molar lacks internal cusp.



(*a*) (*b*) (*c*)

Fig. 22. Skulls of (*a*) badger, (*b*) skunk, (*c*) otter.

13. Tail not bushy but with hair same length as on body; hind feet fully webbed.

14. Tail shorter, about one-quarter of total length; thirty-two teeth. Sea otter. *Enhydra lutris.*

14′. Tail longer, more than one-quarter of total length; thirty-six teeth (Fig. 22 (*c*)). River otter. *Lutra canadensis.*

13′. Tail bushy with hairs longer than body hairs; hind feet not fully webbed.

15. Thirty-eight teeth.

16. Size large, total length more than 30 inches; no orange markings on underparts.

17. Form slender, tail long, 12 inches or more, skull slender, zygomatic breadth less than $2\frac{3}{4}$ inches. Fisher. *Martes pennanti.*

17′. Form stout, tail short, less than 10 inches, skull massive, zygomatic breadth more than $2\frac{3}{4}$ inches. Wolverine. *Gulo luscus.*

16′. Size small, total length less than 30 inches, some orange markings on underparts. *Martes americana.*

15′. Thirty-four teeth.

19. Colour always dark brown; tail without black tip; basilar length more than $2\frac{5}{32}$ inches. Mink. *Mustela vison.*

19′. Colour yellowish-brown or pale brown or white; tail with black tip; or if no black tip, tail shorter than $1\frac{3}{8}$ inches; basilar length less than $2\frac{5}{32}$ inches.

20. Size very small, adults total length less than $9\frac{1}{16}$ inches; tail less than $1\frac{9}{16}$ inches; tail with no black tip or just a scattering of black hairs (Fig. 23 (*a*)). Least weasel. *Mustela rixosa.*

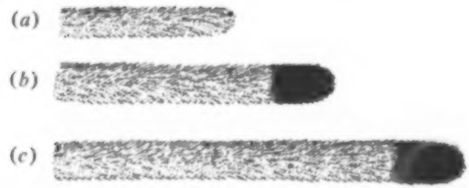


Fig. 23. Tails of (*a*) least weasel, (*b*) short-tailed weasel, and (*c*) long-tailed weasel

20′. Size larger, adults total length greater than $9\frac{1}{16}$ inches; tail longer than $1\frac{9}{16}$ inches; tail with pronounced black tip.

21. Tail length $4\frac{9}{16}$ inches or less (Fig. 23 (*b*)); skull basilar length less than $1\frac{3}{4}$ inches. Short-tailed weasel. *Mustela erminea.*

21′. Tail length more than $4\frac{9}{16}$ inches (Fig. 23 (*c*)); skull basilar length more than $1\frac{3}{4}$ inches. Long-tailed weasel. *Mustela frenata.*

6′. Highly developed trenchant carnassial teeth (Fig. 2); four toes on hind feet.

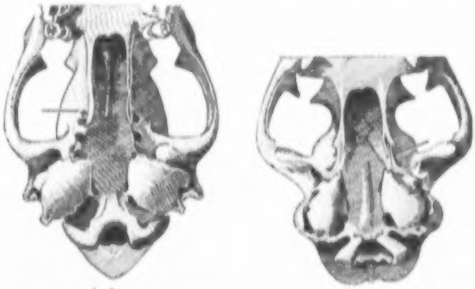

(*a*) (*b*)

Fig. 24. Skulls of (*a*) coyote showing alisphenoid canal and (*b*) cougar showing no alisphenoid canal.

22. Forty-two teeth, alisphenoid canal present (Fig. 24 (*a*)); form dog-like.

23. Adults weigh less than 15 pounds; basilar length of skull less than $5\frac{7}{8}$ inches; postorbital processes thin and concave dorsally. *Red fox. Vulpes fulva.*

23′. Adults weigh more than 15 pounds; basilar length of skull more than $5\frac{7}{8}$ inches; postorbital processes thick and convex dorsally.

24. Weight of adult less than 50 pounds; basilar length of skull less than 7½ inches; greatest length of largest lower cheek tooth less than 1 inch. Coyote. *Canis latrans.*

24′. Weight of adults greater than 50 pounds; basilar length of skull more than 7½ inches; greatest length of largest lower cheek tooth more than 1 inch. Wolf. *Canis lupus.*

22′. Twenty-eight or thirty teeth; alisphenoid canal absent (Fig. 24 (*b*)); form cat-like.

25. Tail more than 25 per cent of total length; thirty teeth; basilar length more than 5⁹⁄₁₆ inches. Mountain lion. *Felis concolor.*

25′. Tail less than 25 per cent of total length; twenty-eight teeth; basilar length less than 5⁹⁄₁₆ inches.

26. Skull, without lower jaw, and with upper canines in place, usually rests on canines and auditory bullæ; two foramina behind bulla (Fig. 25 (*a*)); tail-tip black above, light below; usually one or more dark bands above black tip. Hind foot less than 7⅞ inches. Bobcat. *Lynx rufus.*

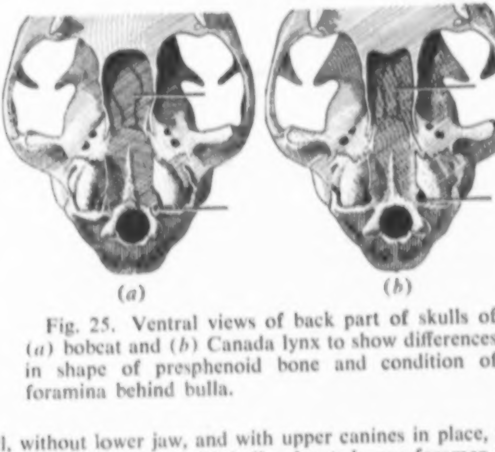

(*a*) (*b*)

Fig. 25. Ventral views of back part of skulls of (*a*) bobcat and (*b*) Canada lynx to show differences in shape of presphenoid bone and condition of foramina behind bulla.

26′. Skull, without lower jaw, and with upper canines in place, usually rests on canines and condyles with bullæ elevated; one foramen behind bulla (Fig. 25 (*b*)); tail-tip wholly black; no dark bars on tail above tip; hind foot more than 7⅞ inches. Lynx. *Lynx canadensis.*

ORDER CARNIVORA

FAMILY CANIDÆ—DOG-LIKE FLESH-EATERS

GENUS CANIS—DOGS

Coyote

Canis latrans Say

Description.—The coyote is a medium-sized dog-like carnivore with a sharp-pointed face, sharp prominent ears, and a long bushy tail. Males are noticeably larger than females, measuring up to 52 inches in total length, including the tail of 15 inches. The pelage is long, heavy, and variable in colour; generally it is grey with buffy tints on the upper parts; light buffy to white in colour below. Some individuals heavily washed with black. The colour and larger size serve to distinguish this animal from the fox. It may be distinguished from the wolf by smaller size, less powerful build, more pointed features, relatively longer ears and a longer tail. The coyote's call, usually given at night, is a series of yipping barks ending in a long, drawn-out high-pitched howl. It is a distinctive sound and readily identifies the animal.

Habitat.—Open prairie, parkland, alpine meadows, and desert are habitat types most often frequented by the coyote. It has infiltrated some previously unoccupied areas of British Columbia where fires and logging have opened the forests.

Biology.—Food consists of small rodents and birds for the large part, supplemented by insects and fruit. Domestic poultry and the young of larger game animals are also utilized when occasion permits. In periods of deep snow or on ice when deer have difficulty in travelling, coyotes attack adult animals. Young, five or six, are born in underground dens after a gestation period of fifty to sixty-five days. Breeding takes place in February.

SUBSPECIES

Canis latrans incolatus Hall

Hall, Univ. Calif. Publ. Zool., *40*:369, 1934. Type locality, Isaac Lake, Bowron Lake region, British Columbia.

Distinction.—A large pale-coloured coyote, cinnamon coloured in summer, pale grey in winter with little or no black markings on

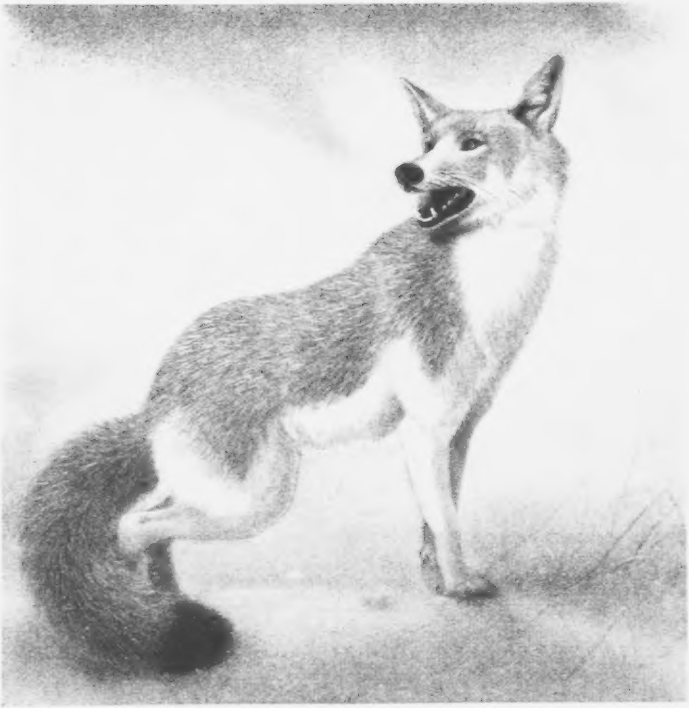
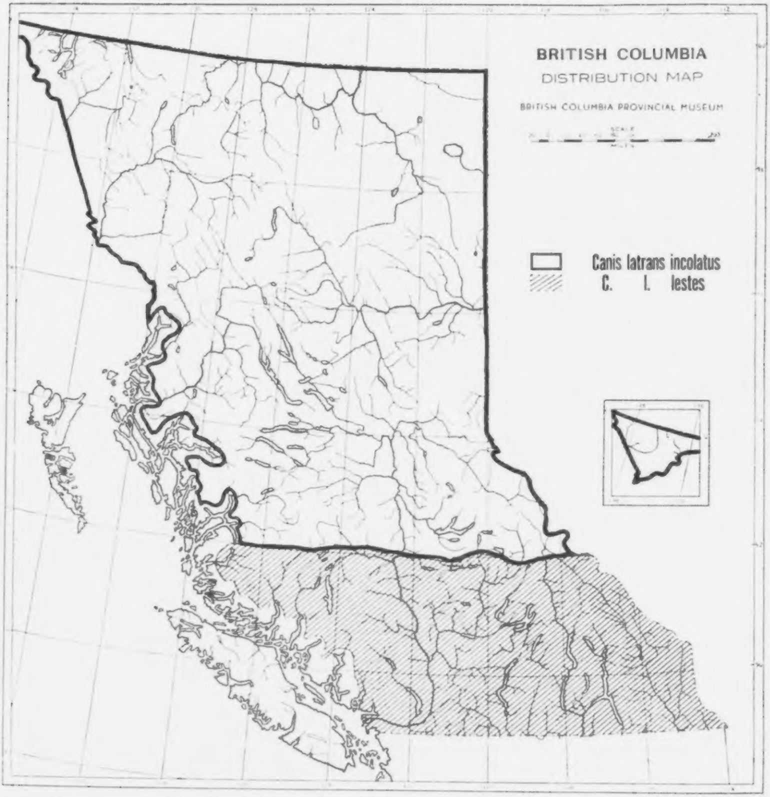


Plate 65. Coyote, *Canis latrans*.

the forelegs. Skull heavier, longer, wider, more dished in frontal region and with a relatively shorter rostrum than in the following subspecies *lestes*.

Measurements.—Seven adult males from Jasper, Alberta, near the British Columbia boundary averaged: Total length 47 inches (45–51); tail length 14 inches (12–15); hind foot 8 inches (7.5–8.5); weight 29 pounds (27–33).

Distribution.—Throughout northern British Columbia south in typical form to the 52nd parallel, intergrading over a wide range


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Canis latrans incolatus
C. l. lestes

Map 37. Distribution of the Coyote, *Canis latrans*.

with *lestes* in southern British Columbia. It extends westward through the Coast Range in the valleys of the Skeena and Bella Coola and other large rivers possibly to the salt water. Some specimens in the Banff area of Alberta show cranial features of both subspecies, and no doubt intergradation takes place at this latitude in British Columbia as well.

Specimen records of *incolatus* from Buckinghorse River, Hudson Hope, Little Prairie, Telkwa, Quick, Driftwood River, Takla Landing, Fort St. James, Ootsa Lake, Chezacut, Quesnel, Isaac Lake, Indianpoint Lake, Bowron River, Lightning Creek, Cottonwood, Horse Lake, Stoney Lake, Spruce Mountain, Anahim Lake, Kleena Kleene, Stuie, Chimney Creek.

Canis latrans lestes Merriam

Merriam, Proc. Biol. Soc. Wash. *11*:25, 1897. Type locality, Toyabe Mountains, near Cloverdale, Nye County, Nevada.

Distinctions.—Similar to *incolatus* in size, but with a skull less dished in the frontal region and with a longer rostrum. Colour generally much darker than *incolatus* and with more black guard hairs on the dorsal side. Specimens examined from British Columbia are with little or no black markings on the forepaws.

Measurements.—Similar to preceding subspecies *incolatus.*

Distribution.—From the 52nd parallel southwards throughout the interior into Washington. So far not recorded from the southern coastal slopes except in extreme south-western British Columbia, where it occurs to salt water in the Fraser Valley and at North Vancouver. Specimen records from Shuswap, Lac du Bois, Salmon Arm, Kamloops, Tranquille Lake, Hat Creek, Nicola, Douglas Lake, Roche Creek, Spences Bridge, Ashnola, Okanagan Landing, Vaseux Lake, Ladner, Chilliwack, Mission, Lulu Island, North Vancouver.

Wolf

Canis lupus Linnæus

Description.—Wolves are the largest of the dog-like carnivores, more heavily built than the coyote, with shorter ears, broader muzzle, and shorter tail. The pelage is long, heavy, and varies greatly in colour and texture with individuals and geographic location. Black colour phases occur in many populations, and in the high north white wolves occur. Shades of grey mixed with varying shades of buffs and browns overlaid with black in varying degree comprise the common colour phase; below the usual colour is whitish, buffy, or grey. Maximum weights reach and very occasionally exceed 140 pounds.

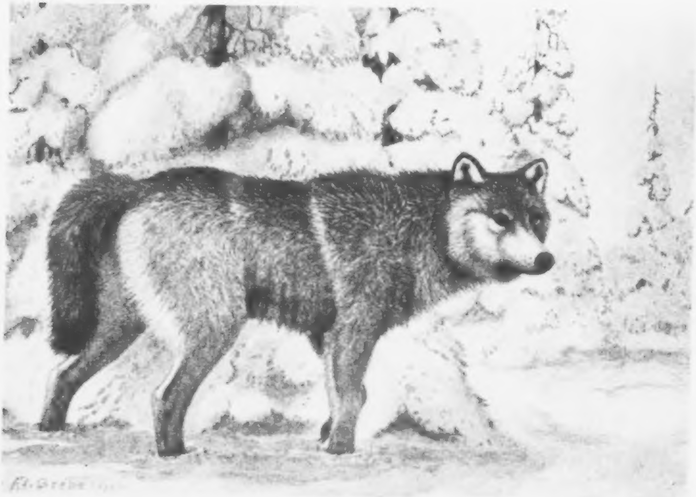


Plate 66. Wolf, *Canis lupus.*

Habitat.—The wolf is an adaptable creature, living in a variety of habitats. Open plains, forests, mountains, and brushlands are all utilized, and in British Columbia we find wolves in the tangled jungles of some coastal islands, through the coniferous forests and deciduous bottom lands, to the high plateaux above the timber-line.

Biology.—In British Columbia wolves feed largely upon deer, moose, caribou, and mountain sheep, and are usually found where these ungulates occur. All kinds of domestic stock are utilized, while most species of smaller mammals and birds, including rodents, foxes, coyotes, grouse, and waterfowl, are also taken as food.

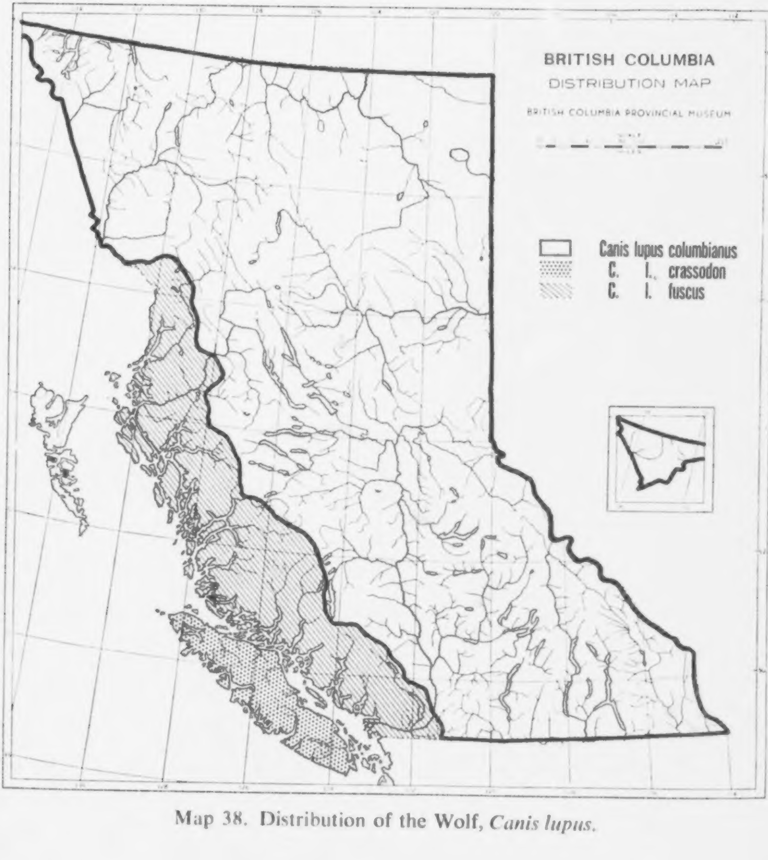
Wolves are excellent runners of great stamina, and secure their chief food, the large ungulates, by running them down. Such animals as deer take to the water to escape and are often successful, although wolves are excellent swimmers. Wolves often hunt in packs comprised of a family group or groups, and they "give tongue" when in pursuit. At least five different calls have been classified by Young and Goldman (1944), the best known, a long drawn-out howl, is heard at night, most often during the breeding season.

As a rule wolves do not attack man and usually give him wide berth. There are a few authentic cases of attacks on man, mostly referring to rabid animals (Young and Goldman).

The breeding period extends from January through February, later if colder; period of gestation sixty-three days; number of young per litter three to thirteen, usually six or seven (Asdell, 1946). Young are usually born and brought up in underground dens and are tended by both parents. Murie (1944) records a small family group of adult wolves assisting a mated pair in providing food for their young.

The effect of wolf predation upon game-animal population has been questioned in recent years, and evidence has been presented (Murie, 1944; Cowan, 1947) contradicting the widespread belief that wherever wolves occur, big-game species are greatly reduced in numbers. Where man is harvesting wildlife or attempting to raise live stock, control is justified, but in the wilds where wolves and the game species have survived and evolved side by side, and still do, human controls are unnecessary.

Remarks. — The individual variations in British Columbia wolves, both in skull characteristics and pelage, are so great that present systematics based on these variables are questioned. At present only two highly variable subspecies of *Canis lupus* are discernible on the British Columbia mainland and northern islands, and one on Vancouver Island.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
▭ Canis lupus columbianus
░ C. l. crassodon
▨ C. l. fuscus

Map 38. Distribution of the Wolf, *Canis lupus.*

SUBSPECIES

Canis lupus columbianus Goldman

Goldman, Proc. Biol. Soc. Wash. *54*:110, 1941. Type locality, Wistaria, at Ootsa Lake, British Columbia.

Distinctions.—As under description.

Measurements.—Four adult males from Quesnel measured: Total length 70 inches (68–73); tail 19 inches (18–20); hind foot 11 inches (10–12); weight 99 pounds (87–112). Extreme weight measured by us, 140 pounds. Three adult females from the same area measured: Total length 65 inches (63–66); tail 18.5 inches (18–19); hind foot 10:5 inches (10–11); weight 82 pounds (73–99).

Distribution.—Specimen records from Atlin, Telegraph Creek, Upper Cache Creek, Little Prairie, Batnuni Valley, Driftwood River, 10 miles south and 50 miles east of Teslin, 94 miles south of Fort Nelson, Prince Rupert, Quick, Barkerville, Wistaria, Chezacut, Quesnel, Avola, Alexandria, Buffalo Lake, Murtle River, Atnarko, Rankin Inlet, near Hope.

Canis lupus crassodon Hall

Hall, Univ. of Calif. Publ. in Zool., *38*:420, 1932. Type locality, Tahsis Canal, Nootka Sound, Vancouver Island, British Columbia.

Distinctions.—Like *columbianus* but smaller and without light colour phases. There are distinctive characteristics in the carnassial teeth.

Measurements.—A mated pair of adults taken near Sooke Lake measured: Male, total length 66 inches; tail 18 inches; hind foot 12 inches; weight 80 pounds. Female: Total length 64 inches; tail 20 inches; hind foot 11 inches, weight 69 pounds.

Distribution.—Confined to Vancouver Island. Specimen records from Tahsis Canal, Friendly Cove, Beaver Creek, Elsie Lake, Cowichan Lake, Saanich Peninsula, Sooke Lake, Beaver Creek.

Canis lupus fuscus Richardson

Richardson, Zool. Capt. Beechey's Voyage of the Blossom, p. 5, 1839. Type locality, banks of the Columbia River below The Dalles, Oregon or Washington.

Distinctions.—Described as differing from *columbianus* in more brownish colour in underfur. Pale-grey colour phase does not occur. There are minor skull differences. The black phase is common.

Measurements.—The only measurements available are of a young animal from Swindle Island: Total length 44 inches; tail 13¾ inches; hind foot 8¾ inches.

Distribution.—Inhabits the coast forest region, northern limit unknown. Specimen records from Swindle Island, Calvert Island, Pemberton, Daisy Lake, Burrard Inlet.

Remarks.—The wolves are so variable in size, pelage colour, and size and shape of skull, and so prone to long-distance movements that in our opinion many more specimens must be examined before any clear picture can be obtained of the distribution of subspecies. Cranial characteristics described for the races supposed to inhabit the British Columbia mainland are minor and not adequately supported; in fact, a critical examination of larger series than available to Goldman (1944) fails to substantiate many of the statements made. The current usage of subspecific names should be regarded as tentative.

GENUS VULPES—FOXES

Red Fox

Vulpes fulva (Desmarest)

Description.—Slender and dog-like, measuring up to 4 feet long, including a bushy tail of 16 inches; pelage long and fine; the head with sharp-pointed face and prominent, erect ears. Colour is variable, and the term " red fox " is misleading, for black, silver, and " cross " phases are common in this species. The " cross " phase is a combination of the red and black, the dark areas forming a cross when pelted skins are stretched. In the common red phase the back of the ear is black, forequarters and sides reddish-yellow,

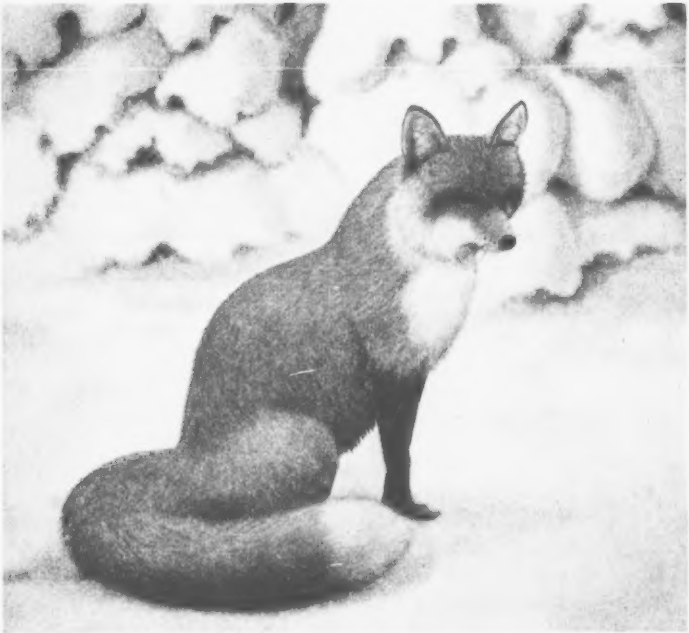


Plate 67. Red Fox, *Vulpes fulva.*

darkening on the back and tail; tail is red with a white tip but the guard hairs are often irregularly tipped in black throughout its length; sometimes a dark sub-terminal band is present. Pelage in silver phase black with heavily white-tipped guard hairs, especially from the shoulders back to the tail. The tail black with white tip.

Colour, shape, and size distinguish the fox from the coyote, the only British Columbia mammal with which it may be confused.

Habitat.—In British Columbia the red fox is an animal of the " edge " frequenting the parkland-type habitats and alplands where open meadows are interspersed with groves of bush and trees. It is found as well around lake-shores, river-banks, and broken country where natural clearings prevail. On Vancouver Island, where stock of an unknown subspecies was accidentally introduced, it frequents the logged-over lands near the point of introduction.

Biology.—The red fox attains sexual maturity at 10 months of age, breeding in January and February; gestation period forty-nine to fifty-five days, litters up to seven. Food includes birds and small mammals supplemented in season by insects, fruits, and berries.

SUBSPECIES

Vulpes fulva cascadensis Merriam

Merriam, Proc. Wash. Acad. Sci. 2:665, 1900. Type locality, Trout Lake, south base of Mount Adams, Skamania County, Washington.

Distinctions.—Dorsal colour pale yellowish-rust darkest on shoulders; tail with terminal half dusky, tip white; lower parts of all legs black. The black and cross phases are very rare in this subspecies.

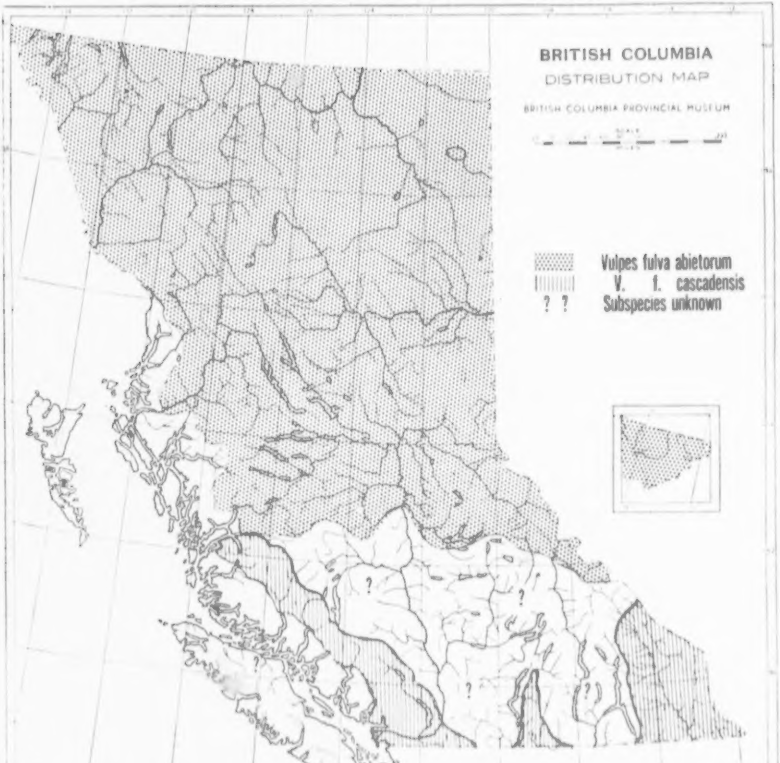
Measurements.—Two adult males and one adult female from Boundary Bay and Abbotsford with almost identical measurements averaged: Total length 40.5 inches; tail 14.5 inches; hind foot 6 inches. One of the males weighed 10 pounds 5 ounces.

Distribution.—This subspecies occurs plentifully in the Puget Sound Lowlands and throughout the Cascade Mountains northward into the Cariboo Parkland. Foxes, probably of this race, occur in the south, eastward as far as the Rocky Mountains. They do not occur in the heavily forested western slopes of the coastal mountains adjacent to the sea. Specimen records from Chezacut, Anahim Lake, One Eye Lake, Kleena Kleene, Homathko River, Abbotsford, Boundary Bay, Chilliwack, Baldy Mountain near Bridesville.

Vulpes fulva abietorum Merriam

Merriam, Proc. Wash. Acad. Sci. 2:669, 1900. Type locality, Stuart Lake, British Columbia.

Distinctions.—Darker than *cascadensis,* with longer tail. The dark colour phases more abundant.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Vulpes fulva abietorum
V. f. cascadensis
? ? Subspecies unknown
?
?
?
?
?

Map 39. Distribution of the Red Fox, *Vulpes fulva.*

Measurements.—Only one set of measurements of this subspecies is available to us, an adult female from Quesnel which measured: Total length 41 inches; tail 16 inches; hind foot 7 inches; weight 8¼ pounds.

Distribution.—Occurs in suitable habitat throughout northern British Columbia, south at least to Quesnel. Red foxes are distributed throughout the Province, occurring more plentifully in the northern regions and in the sub-alpine parklands to the south. The subspecific status of red foxes occurring in south central British Columbia is obscure. It is extremely likely that escaped fur-farm animals of unidentified stock from other parts of the continent have further confused the systematic status of the foxes in settled areas of the Province.

Specimen records from Atlin, Telegraph Creek, Little Prairie, Halfway River, Sustut River, Takla Lake, Bear Lake, Driftwood River, Quick, Quesnel, Indianpoint Lake.

FAMILY URSIDÆ—BEARS

GENUS EUARCTOS—BLACK BEAR

American Black Bear

Euarctos americanus Pallas

Description.—Large, bulky carnivorous mammals with highly variable weights ranging in adults from 125 to over 600 pounds. Total length averaging about 5 feet, including a short tail some 5 inches long. Limbs are heavy, feet plantigrade, armed with five short, recurving claws. Pelage varies in texture and length with individuals and season. Colour varies from jet black through brown, bluish, to white, depending upon geographic location. A patch of white is often present on the chest; the neck is short and heavy, the head large with small eyes. The outline of the head and snout is convex or flat, the ear pinna easily visible but not prominent.

Bulk and shape serve to distinguish bears from any other animal. Black bears may be distinguished from grizzlies by their smaller size, by the more horizontal shoulder-rump line, head usually carried higher, the longest claw less than 2½ inches, and

Plate 68. American Black Bear, *Euarctos americanus.*

crown of the third molar less than 1⅓ inches in length. Grizzlies often show a whitish wash over the shoulders, which is rare in black bears.

Habitat. — Wooded areas generally, concentrating on berry-patches and spawning-streams in season.

Biology.—Omnivorous; the diet includes almost any form of animal food from insects to mammals such as marmots and deer when available. Grasses, domestic grain-crops, vegetables, fruits, and a large variety of wild plants are utilized in season. On the coast, black bears live primarily upon berries, fish, and marine invertebrates. Young, one to four, usually two, are born in January or February while the female is in hibernation. At birth they are about 8 inches in length. Black bears breed at 3 years of age, usually in June or July. The female does not ovulate while nursing, and consequently produces young only every other year.

Time of hibernation varies with locality. In northern areas where winter comes early, denning occurs in November; on the south end of Vancouver Island, bears are sometimes active during the winter months.

SUBSPECIES

Euarctos americanus altifrontalis (Elliot)

Elliot, Field Columb. Mus., publ. 80, Zoo Ser., *3*:234, 1903. Type locality, Lake Crescent, Olympic Mountains, Callam County, Washington.

Distinctions.—Colour black, as a rule, with few occurrences of brown colour phase. When the brown colour phase does occur, it is usually dark chocolate brown. Skull higher with a more prominent " forehead " than in the following subspecies and with wider molar teeth.

Measurements.—Two 3-year-old males from Manning Park measured: Total length 54 and 45½ inches; tail 3 and 3 inches; hind foot 8¾ and 8½ inches. Large individuals weigh up to 600 pounds and measure about 70 inches in total length.

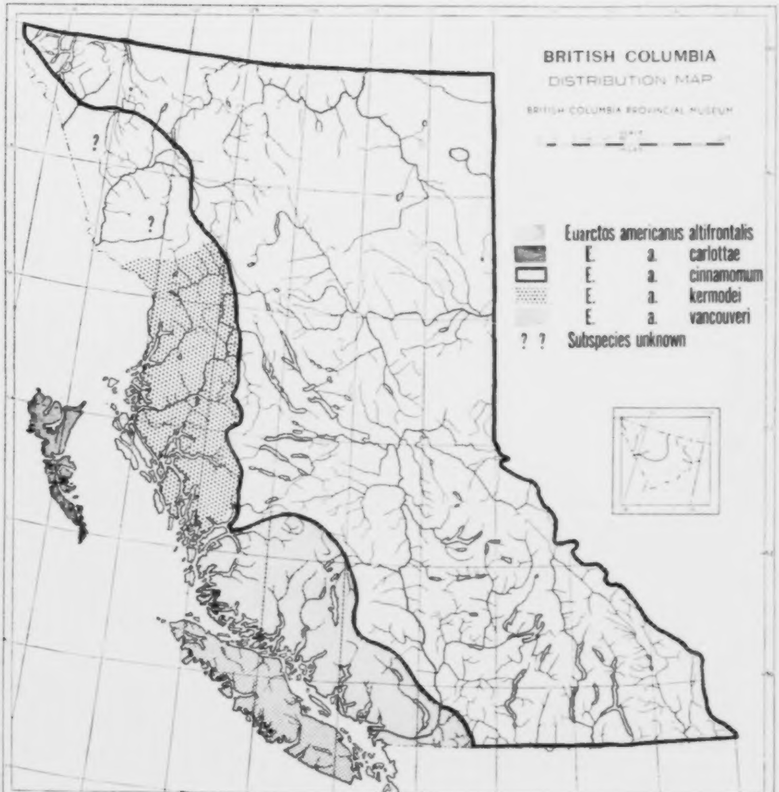
Distribution.—The status and distributions of subspecies of black bear in British Columbia are not well known due to lack of material from many areas. The subspecies *altifrontalis* is, at present, regarded as a coastal race, inhabiting the mainland from the southern boundary north to the vicinity of Burke Channel, where it is believed to intergrade with the northern coastal subspecies *kermodei*. Both *altifrontalis* and *kermodei* are believed to occupy the coastal plains and western slopes eastwards at least to the summit of the Coast Range, where intergradation with the interior race *cinnamomum* occurs.

Specimen records of *altifrontalis* from Bella Coola, Atnarko, Owikeno Lake, Redstone, Namu, Lillooet, Manning Park, Harrison Lake, Langley, Sechelt, North Vancouver.

Euarctos americanus carlottæ (Osgood)

Osgood, North Amer. Fauna *21*:30, 1901. Type locality, Masset, Graham Island, Queen Charlotte Islands, British Columbia.

Distinctions.—Large size and a wide massive skull with large molars distinguish this completely isolated subspecies from others of its kind. No brown phase has yet been recorded on the islands.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Euarctos americanus altifrontalis
E. a. carlottae
E. a. cinnamomum
E. a. kermodei
E. a. vancouveri
? ? Subspecies unknown
?
?

Map 40. Distribution of the American Black Bear, *Euarctos americanus*.

Measurements.—Body measurements for this subspecies are completely lacking.

Distribution.—Confined to the Queen Charlotte Islands, occurring on all of the larger islands. Specimen records from Masset, Tlell, Sandspit, Sewell Bay. Observed by the authors at Bruin Bay, Naden Harbour, Kummis Slough, Port Clements, Cape Ball, Rose Spit, Sangan River, Frederick Island, Hippa Island, Skidegate Channel, Copper Bay, Louise Island, Rose Harbour.

Euarctos americanus cinnamomum (Audubon and Bachman)

Audubon and Bachman, Quadrupeds of North America, *3*:125, 1854. Type locality, Jim Ford Creek, Lower Clearwater River, Idaho.

Distinctions.—Similar to *altifrontalis* but larger and browner even in the dark phase. Brown phase lighter in colour, more cinnamon, and occurs in varying proportion up to 50 per cent of the population. Skull lacks the elevated forehead of *altifrontalis* and has relatively narrow molar teeth.

Measurements.—Two fully adult specimens from near Banff, Alberta, measured: Male—total length 73 inches; tail 4 inches; hind foot 10 inches; weighed 250 pounds. Female—total length 62 inches; tail 4 inches; hind foot 10 inches; weighed 150 pounds. Both animals were thin. A specimen weighing over 600 pounds was shot and weighed by the Warden Service at Jasper, Alberta.

Distribution.—This subspecies occupies the entire Province east of the Coast Range. It probably intergrades with *altifrontalis* and *kermodei* where the ranges meet. At present sufficient data and complete specimens of all mainland subspecies are wanting. Until such time as this material is available, the races *hunteri* and *randi* (Anderson, 1944) are regarded as synonymous with *cinnamomum*.

Specimen records of *cinnamomum* from 10 miles west of Fort Nelson, Buckinghorse River 94 miles south of Fort Nelson, Bear Lake, Driftwood River, Tetana Lake, Wistaria, Eutsuk Lake, Quick, Indianpoint Lake and vicinity, Hemp Creek, Barriere, Chezacut, Kamloops, Mount Revelstoke.

Euarctos americanus kermodei (Hornaday)

Hornaday, Ninth Ann. Rept. N.Y. Zool. Soc. 1904. Type locality, Gribble Island, British Columbia.

Distinctions.—The occurrence of a white colour phase in this population of bears led to its description. At present not sufficient material is available to present a comprehensive diagnosis, and the two adult skulls available here show great individual variation—one with a short thick rostrum and a high frontal region resembling *altifrontalis*, the other with a long, low, narrow skull. Bears of black pelage are far more common than the white colour phase in the area where the latter occurs, but if the name *kermodei* is valid it is applicable to both black and white bears of that region.

Measurements.—A fully adult white specimen from Princess Royal Island raised in captivity at Beacon Hill Park in Victoria measured: Total length 69 inches; tail 5 inches; hind foot 9 inches; and weighed 300 pounds when it died.

Distribution.—Princess Royal, Gribbell, and probably other northern coastal islands. On the mainland is occurs from Burke Channel northwards an unknown distance. On the basis of one white phase specimen from north of the Nass River, the subspecies range is extended northward at least to that point (Anderson, 1944). Specimen records of *kermodei* from headwaters of the Nass River*, Port Essington,* Usk, Hazelton,* Princess Royal Island, Gribbell Island, Kwatna Inlet.*

Remarks.—The status of black bear in extreme north-western British Columbia is unknown and based entirely upon conjecture. It is highly probable, however, that the glacier or blue bear *E.a. emmonsi* occurs in north-western British Columbia, as specimens taken in the Yukon at Bennett Lake and Teslin Lake within 10 miles of the British Columbia boundary are catalogued at the National Museum of Canada.

Euarctos americanus vancouveri Hall

Hall, Univ. Calif. Publ. Zool., *30*:231, 1928. Type locality, King Solomon's Basin, Vancouver Island, British Columbia.

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* Specimens not examined by the authors.

Distinctions.—Like *carlottæ* in large size, wide massive skull and lack of brown colour phase, but with smaller molars. Massive skull characteristics serve to distinguish it from the nearest mainland form *altifrontalis*.

Measurements.—Body measurements for this subspecies are wanting despite numerous specimens taken by various collectors. A male not fully adult taken at Jordan River measured: Total length 74 inches; tail 7 inches; hind foot 11 inches; weight approximately 200 pounds.

Distribution.—Confined to Vancouver Island, where it is generally distributed. Specimen records from selected localities: Port Hardy, Sea Otter Cove, Quatsino, Holberg, Quinsam River, Port Alberni, Cowichan Lake, Duncan, Mount Sicker, Victoria, Jordan River.

GENUS URSUS—GRIZZLY AND BIG BROWN BEARS

Grizzly Bear

Ursus arctos horribilis Ord

Ord, Guthrie's Geog., 2nd Amer. ed., 2:291, 1815. Type locality, Great Falls, Cascade County, Montana.

Description.—A large heavy-bodied bear weighing up to 1,100 pounds; tail short, limbs heavy, claws long, slightly curved, longer in spring and among animals that do little digging. Face outline usually concave. Colour extremely variable, from cream colour through brown to black, frequently with whitish tipping, giving a grizzled appearance. The pelage on the back is usually paler than that on the legs and ears.

The grizzly requires separation only from the black bear, and the distinctions are given under that species. The high shoulder and sloping back line are characteristic.

Measurements.—An adult male from Jasper, Alberta, near the British Columbia border measured: Total length 73 inches; tail 6¾ inches; hind foot 10 inches; and weighed 450 pounds. This is a good average specimen, although much larger individuals are on record. The maximum weights actually recorded are in the vicinity of 1,000 pounds. The largest bear so far recorded officially

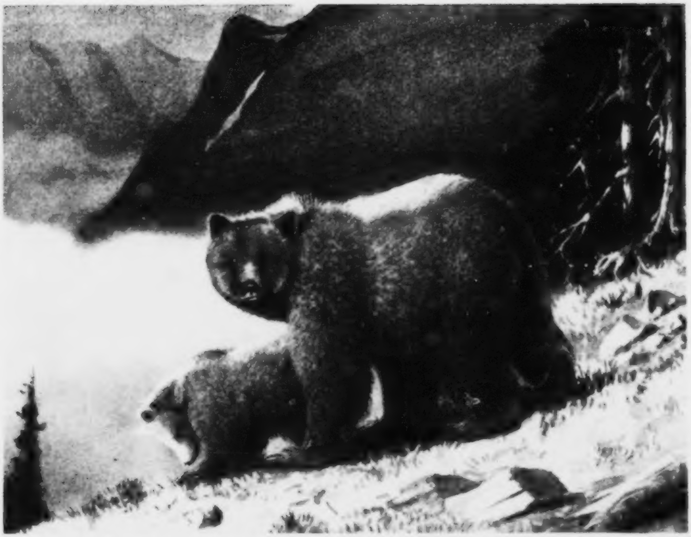


Plate 69. Grizzly Bear, *Ursus arctos horribilis.*

in British Columbia was taken in Tweedsmuir Park. The skull of this animal was 16 by $9\frac{7}{16}$ inches and holds the No. 2 position in the Boone and Crocket Club World Record Series for grizzly bears (excluding Alaska brown bear).

Habitat.—Wilderness areas generally. On the coast centred in coniferous forests and mountains along the salmon-spawning streams. In the interior usually found at higher altitudes around rock-slides, talus slopes, and clearings where berries prevail. Encountered also in open alpine country where hoary marmots dwell. Throughout much of the Province these animals change habitat with the season, feeding on newly sprouted vegetation on the south-facing slopes in the early spring, shifting to berry-patches and marmot colonies during the summer, and descending to concentrate on the salmon-spawning streams in the late fall.

Biology.—Grizzly bears breed in June and July; young, one to four (usually two), born in January, February, or March (Asdell, 1946). Young are born while the female is in hibernation and measure 9 or 10 inches in length. The female does not ovulate while nursing young, and consequently, like the black bear, these animals produce young in alternate years. Food consists of grasses, forbs, roots, berries, insects, fish, carrion, and any prey, large or small. Mice, birds, deer, and big-game animals are all taken when opportunity presents. Hoary marmots and groundsquirrels form part of the diet where they occur on grizzly range. The bears secure them by digging, and evidence of this activity is often seen in the alpine country. Fish, principally spawning salmon, are secured on the shallow spawning-beds, usually by direct seizure with the mouth. The authors, however, have seen grizzly bears knocking salmon out of the stream with the forepaws after first herding the spent fish toward shore.

When the temperature drops in the fall, the grizzly bear retreats to a cave, hollow tree, windfall, or like place to hibernate. The fat accumulated through the summer and fall sustains them until the following spring. Time of hibernation and emergence varies with the climate, but most British Columbia grizzlies are in hibernation in November, appearing again in March and April.

These bears are potentially dangerous as all wild animals are, but as a rule they are shy creatures of crepuscular or nocturnal habit. The appearance of man usually puts the grizzly to flight, and the noisy traveller seldom sees one at close range. Attacks on man are frequent and usually result from a sudden meeting at close range. Unprovoked attack under other circumstances occur infrequently.

Distribution.—Grizzly bears occur throughout the mountainous area of the Province and are found in numbers along the entire coast-line, although so far not recorded from any of the coastal islands. The heads of practically every inlet along the British Columbia coast harbour appreciable populations of grizzly bears.

Specimen records from Chilkat River, Atlin, Telegraph Creek, Klappan Creek, Dease Lake, Tatletui Lake, Clearwater Creek (branch of Stikine River), Driftwood River, Burns Lake, Big Eutsuk Lake, Bowron Lake, Incomappleux River, Kootenay Pass, Brisco, Beaverfoot Range, Moose Pass, Bridge River, head of

Jervis Inlet, Lillooet Lake, Pemberton Lake, Field, Eagle River (Adams Lake), Iskut Lake, Bella Coola, Hagensborg, Stuie, Atnarko.

Remarks.—Merriam's 1918 work led to much confusion in the names and distribution of the grizzly bears. At the present time all grizzly and big brown bears in British Columbia and mainland Alaska have been designated as *Ursus arctos horribilis* (Rausch, 1953). Subspecies certainly exist but cannot be designated until the group is given systematic revision.

FAMILY PROCYONIDÆ—RACCOONS, NASUAS, AND RINGTAILS

GENUS PROCYON—RACCOONS

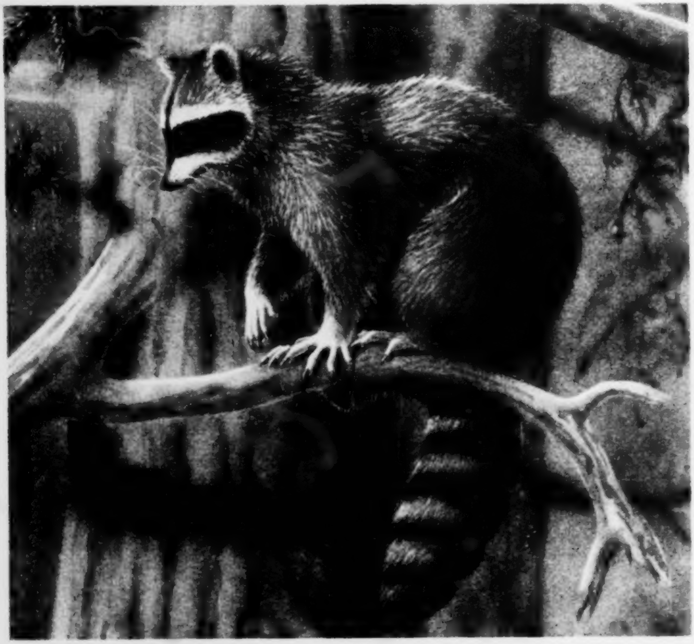


Plate 70. Raccoon, *Procyon lotor*.

Raccoon

Procyon lotor (Linnæus)

Description.—A chunky, medium-sized carnivore averaging about 36 inches in total length, including the tail of nearly 12 inches. Body fur is long and generally grey in colour; tail is bushy, ringed with black bands. Face is sharp-pointed with a black mask about the eyes. Fore and hind feet bear non-retractile claws; ears prominent and erect.

Habitat.—Found in both deciduous and coniferous forests and shrubbery, somewhat aboreal, utilizes hollow trees, and sometimes burrows under the roots. On the coast it feeds almost entirely on the beach.

Biology.—Omnivorous, feeding upon almost everything present—fish, crayfish, crabs, snails, snakes, birds, frogs, fruits, and vegetables. In settled areas, depredations upon domestic fowl and orchards have placed this animal on the vermin list. Male breeds at 2 years, female at 1 year; litters of from one to six young are born in spring, the month varying with latitude. The average gestation period is sixty-three days.

SUBSPECIES

Procyon lotor pacificus Merriam

Merriam, North Amer. Fauna *16*:107, 1899. Type locality, Lake Keechelus, Kittitas County, Washington.

Distinctions.—Differences from *vancouverensis,* the only other subspecies occurring within the Province, are given under that race.

Measurements.—Weights and measurements are highly variable. Three adults from near Vancouver averaged: Total length 33 inches (30–37); tail 12 inches (10½–13); hind foot 4¾ inches (4¾–5); weights up to 22½ pounds.

Distribution.—From the southern boundary north in the west to Kingcome Inlet and in the Okanagan Valley to Okanagan Falls. Specimen records from Vancouver, North Vancouver, Abbotsford, Vaseux Lake, Okanagan Falls.

Procyon lotor vancouverensis Nelson and Goldman

Nelson and Goldman, Journ. Mammal *11*:458, 1930. Type locality, Quatsino Sound, Vancouver Island, British Columbia.

Distinctions.— Supposedly differs from *pacificus* mainly in smaller size, darker colour, and in several skull characters, but further study of the differences is required.

Measurements.— Seven adult specimens measured: Total length 32 inches (29–33); tail 11 inches (10–12); hind foot 4½ inches (4–4½). Weights of six adults averaged 12 pounds (10–13½).

Distribution.—Throughout Vancouver Island, also on Saltspring Island, Saturna Island, Pender Island, introduced on Cox Island (Cape Scott) and on Graham Island. Specimen records from Port McNeill, Cox Island, Quatsino, Alberni, Nanaimo, Beaver Creek, Millstream, Saanich Arm, Mount Tolmie, Cadboro Bay, Becher Bay, Sooke.

FAMILY MUSTELIDÆ—WEASEL-LIKE CARNIVORES

GENUS MARTES—MARTENS AND FISHERS

Marten

Martes americana (Turton)

Description.—A small carnivore of weasel-like shape similar to the mink in size but with longer, fluffier pelage, longer legs, a longer more bushy tail, and with more prominent ears. Males average about 10 per cent larger than females. The upper parts are usually brown in colour, shading to darker brown on the legs and tail; head is sometimes paler in colour than the body. Underparts richer in colour as a rule, with a distinctive orange or yellow patch on the throat and breast.

Habitat.—Coniferous forests throughout the Province, including Vancouver Island, the Queen Charlotte Islands, and some of the larger coastal islands. It occurs from sea-level to timber-line at all times of the year, but is more abundant at higher elevations during the summer months. In coastal areas it often forages along the sea-beaches. This marten is found to a lesser extent in deciduous forests and talus throughout its range in British Columbia.

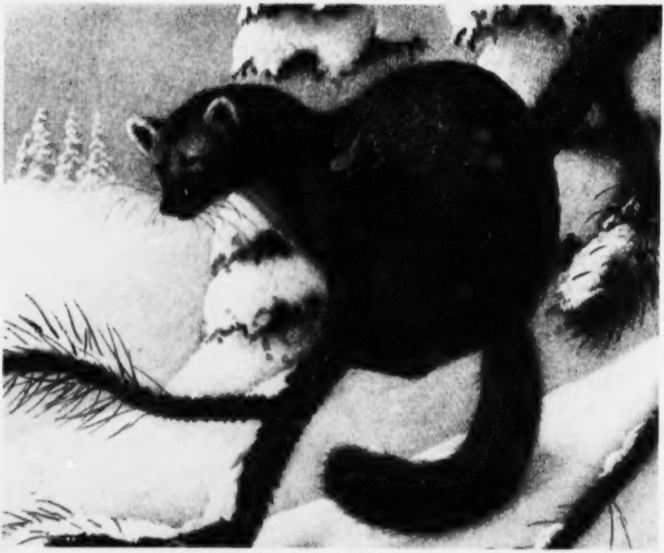


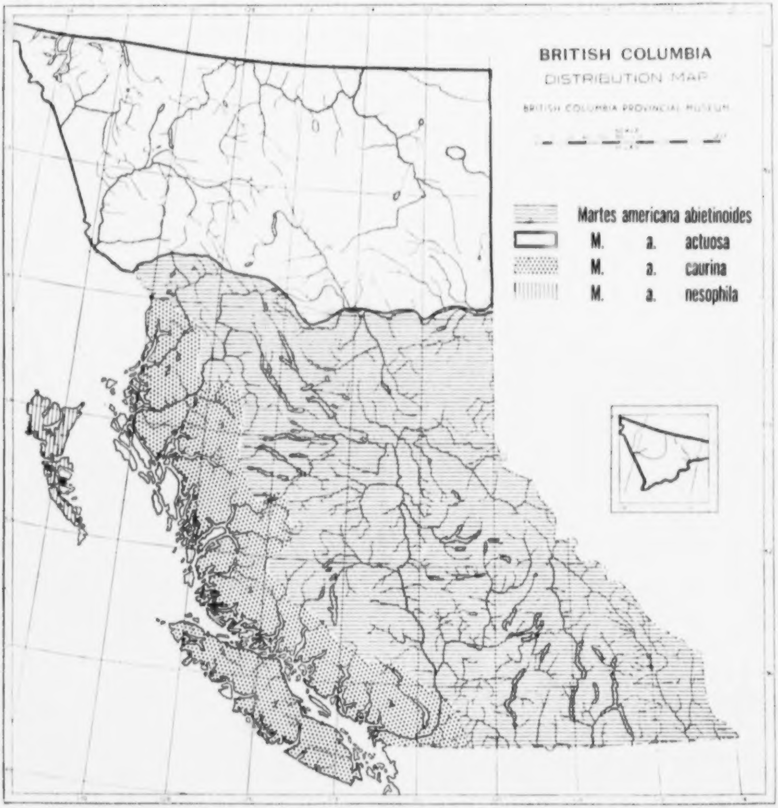
Plate 71. Marten, *Martes americana.*

Biology.—Food consists largely of microtine rodents, although animals such as squirrels, rabbits, marine crustraceans, birds, and insects are also eaten. Mating occurs from June to September; young, two to six, average three, born after a gestation period of about ten months, at least four months of this being taken up by delayed implantation. Young leave the nest in their seventh or eighth week and attain sexual maturity at 2 years of age. The females produce their first litter in the third year and usually one litter per annum thereafter. Male martens are known to range over 10 to 15 square miles during the winter months; females are more sedentary.

SUBSPECIES

Martes americana abietinoides Gray

Gray, Proc. Zool. Soc. London, *1*:106, 1865. Type locality, "edge of the humid western slopes of the Rocky Mountains some-


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Martes americana abietinoides
M. a. actuosa
M. a. caurina
M. a. nesophila

Map 41. Distribution of the Marten, *Martes americana.*

where between Kicking Horse Pass and the Columbia River" (Rhoads, 1903).

Distinctions.—Distinguished from other subspecies occurring in British Columbia by smaller size, pale-yellow throat patch and darker body pelage, especially in summer.

Measurements.—Means and extremes of twenty-five adult males: Total length 595 mm. (486–704); tail 173 mm. (120–230); hind foot 95 mm. (60–130). Forty adult females measured: Total length 575 mm. (470–680); tail 152 mm. (100–200); hind foot 87 mm. (55–120) (Hagmeier, 1955).

Distribution.—All of forested British Columbia east of the summit of the Coast Range and north to the Omineca and Peace Rivers, where it intergrades over a wide area with *M.a. actuosa.* Along the eastern side of the Coast Range *M.a. abietinoides* intergrades abruptly with *M.a. caurina.*

Specimens examined are from Fort Grahame, Sustut River, Omineca River, Driftwood River, Bulkley House, Babine Post-office, Takla Lake, Nation Lake, Little Prairie, Babine Lake, Stuart Lake, Wistaria Post-office, Tahtsa Lake, Tatuk Lake, Fraser River above mouth of Big Salmon River, Barkerville, Moose Pass, Indianpoint Lake, Quesnel Lake, Murtle Lake, Blue River, Lempriere, Gosnel, Golden, North Arm of Shuswap Lake, North Fork of Eagle River, Vermilion Crossing, Vermilion Pass, east side of Beaverroot Range, Akolkolex River, south-east of Revelstoke, Provincial boundary west of Banff, Lumby, Creighton Valley, Whiteswan Lake, Okanagan Lake, Kettle Valley, Nelson, Greenwood, Yahk, Cranbrook, Morrissey, Manning Park, Akamina River.

Martes americana actuosa (Osgood)

Osgood, North Amer. Fauna *19*:43, 1900. Type locality, Fort Yukon, Alaska.

Distinctions.—Similar to the preceding subspecies but larger and with a paler, sometimes almost whitish, coloured head.

Measurements.—One hundred and thirty-seven adult males measured: Total length 636 mm. (530–730); tail 200 mm. (140–240); hind foot 102 mm. (80–120). Seventy-five adult females:

Total length 567 mm. (455–690); tail 170 mm. (110–220); hind foot 92 mm. (60–118) (Hagmeier, 1955).

Distribution.—Occurs throughout British Columbia north of the Peace and Omineca Rivers and west of the eastern side of the Coast Range. Hagmeier (1955) found that this subspecies as represented in British Columbia is considerably smaller than its supposed equivalents in Alaska, and, though it has in common with it a pale head, is actually an intergrade in other characteristics between the Alaskan *actuosa* and *abietinoides* occupying the southern portions of the Province west to the Coast Range.

Specimens from Atlin, Muskwa River, Bear Lake, Clearwater River, lower Iskut River, Tahtsa Lake, Buckingham, Upper Smith River, Lower Post, Fort Halkett.

Martes americana caurina (Merriam)

Merriam, North Amer. Fauna *4*:27, 1890. Type locality, Chehalis County, Washington (coast near Gray's Harbour).

Distinctions.—Richer brown, inclining to cinnamon, and with underparts deep orange rather than yellowish. Orange coloration on underparts more extensive, often extending to the vent. Fur less luxuriant and with comparatively less underfur than in the preceding subspecies. Skull characteristics are distinctive and readily separate this subspecies from those described above.

Measurements.—Eight adult males measured: Total length 637 mm. (540–730); tail 210 mm. (160–260); hind foot 95 mm. (75–107). Sixty-three females measured: Total length 590 mm. (510–670); tail 190 mm. (140–240); hind foot 80 mm. (67–96).

Distribution.—The entire coastal regions of the Province west of the eastern edge of the Coast Range, including Vancouver Island. Commercial trapping records indicate Pitt, McCauley, and Hawksbury Islands as occupied by these animals (McLeod, 1950). Specimens from Hole in the Wall, mouth of the Skeena River, Kynoch Inlet, mouth of the Kimsquit River, mouth of the Dean River, Bella Coola, Tallheo, Mount Brilliant, Stuie, Atnarko, Anahim Lake, Kleena Kleene, Lillooet, Pemberton, Alta Lake, Sproat Lake, Mount Whistler, Cheakamus River, Cheakamus Lake, Glacier Mountain, Port Moody, Chilliwack, Lightning Lake (intergrades with *abietinoides*), Quatsino, Comox, Wedge Creek, French Creek, Cowichan Lake, Errington, Green Mountain, Victoria.

Remarks.—Hagmeier (1955) in his highly critical work found no significant difference between the martens on Vancouver Island and the coastal mainland.

Martes americana nesophila (Osgood)

Osgood, North Amer. Fauna *21*:33, 1901. Type locality, Masset, Queen Charlotte Islands, British Columbia.

Distinctions.—Similar to *M.a. caurina* but larger and paler with a pronounced orange suffusion to the underfur. Pelage is much shorter haired than in *caurina*.

Measurements.—Four adult males from Graham Island measured: Total length 655 mm. (643–673); tail 210 mm. (201–224); hind foot 89 mm. (86–94); weight 3 pounds (2 pounds 10 ounces to 3 pounds 6 ounces). One female from Moresby Island measured: Total length 640 mm.; tail 156 mm.; hind foot 76 mm.; not weighed.

Distribution.—Graham and Moresby Islands of the Queen Charlotte Islands group. Specimens from Cape Knox, Virago Sound, Masset, west side of Masset Inlet, Sewell Inlet (Moresby Island).

Fisher

Martes pennanti (Erxleben)

Description.—A large marten, much like *americana* in proportion, but larger, males often measuring more than 36 inches in length. Fur dark brown to nearly black, often with white tippings to some of the hairs of the upper parts, and with throat patch small and white, or absent. The weight of the fisher varies from about 1,500 to 4,500 grams or roughly 3½ to over 9 pounds. As in marten, males exceed females about 20 per cent or more in weight and size.

Habitat.—The fisher is most numerous in mixed forests of coniferous and deciduous trees and is rarely, if ever, found above tree-line.

Biology.—Being a larger animal than the marten, larger prey is taken. Grouse, red squirrels, hares, porcupines, as well as mice

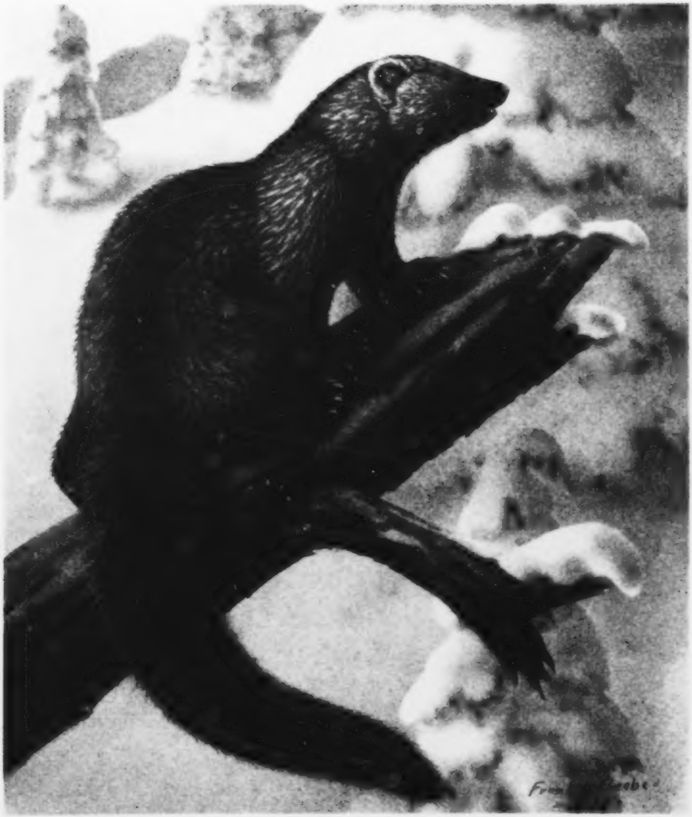


Plate 72. Fisher, *Martes pennanti*.

and shrews have been reported as food; insects, fruits, and berries are sometimes eaten.

The fisher is polygamous. Mating occurs three to eighteen days after birth of the previous year's litter, probably from about March 20th to May 15th. Gestation lasts about 350 days (210–

370 days), at least nine months of this time being taken up by delay in the implantation of the blastocyst. The young are born from March 15th to the end of April; the nest is made in a hole in a tree or in the ground. The litter is most often two or three young, with extremes of one to five; young leave the nest at nine to ten weeks and are fully grown by seven months. Mating first occurs in their second year, the first litter being born in the third year; a litter may be born every year thereafter.

The animals vary locally in their density; each generally remains within an area of 2 to 6 square miles. Unlike marten, there appear to be more females than males.

SUBSPECIES

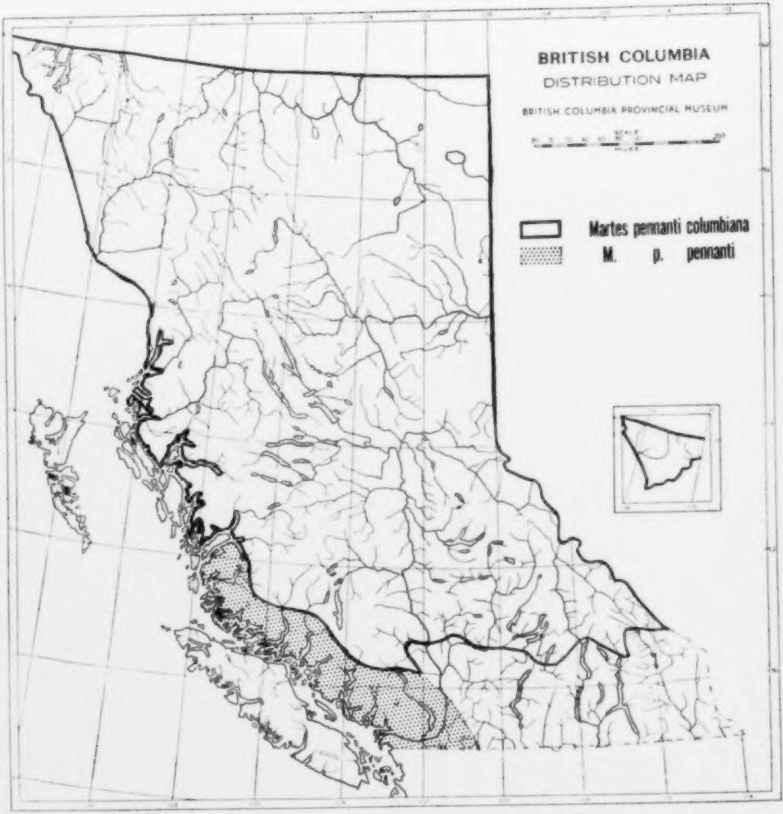
Martes pennanti columbiana Goldman

Goldman, Proc. Biol. Soc. Wash. *48*:176, 1935. Type locality, Stuart Lake, near headwaters of Fraser River, British Columbia.

Distinctions. — Indistinguishable from the other race of this species, except by its somewhat greater size and slightly paler colour.

Measurements.—Eighteen males measured: Total length 1,010 mm. (40½ inches); tail length 400 mm. (16 inches); hind foot 125 mm. (5 inches): Nineteen females total length 870 mm. (35 inches); tail length 300 mm. (12 inches); hind foot 112 mm. (4½ inches (*Hagmeier*, 1955). One male weighed 11 pounds, a female 5½ pounds.

Distribution.—All of forested British Columbia east of the eastern limit of the Coast Range; absent apparently from the very north-west part of the Province. Specimens examined are from near Fort Halkett, Fort Nelson, Cameron River, Takla Lake, Pine River, Table Lake, Stuart Lake, Wistaria, mouth of Bowron River, Cottonwood Creek, Quesnel, Beaver Pass, Lightning Creek, Clisbake near Meridian, Moorehead Lake, Blue River, Wells Gray Park, head of Horsefly River, Little Prairie, Horsefly, Meldrum Creek, Barkerville, Bonaparte Lake, Cook Creek, Hemp Creek, Clearwater Post-office, 40 miles north of Revelstoke, Albas, Sicamous, Salmon Arm, Kamloops district, Cache Creek.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Martes pennanti columbiana
M. p. pennanti

Map 42. Distribution of the Fisher, *Martes pennanti*.

Martes pennanti pennanti (Erxleben)

Erxleben, Sept. Regni Onim. *1*:470, 1777. Type locality, Eastern Canada.

Distinctions.—Generally darker in colour and smaller in size than *columbiana,* but the differences are of minor degree.

Measurements.—Fifty-two males from all parts of the range averaged: Total length 1003 mm. (40 inches); tail 392 mm. (12 inches); hind foot 118 mm. (4½ inches); weight 9½ pounds. Fifty-eight females correspondingly: 865 mm. (34½ inches); 357 mm. (14 inches); 98 mm. (4 inches) (Hagmeier, 1955).

Distribution.—The Cascade and Coast Ranges; northern limit not determined. Specimens examined by the authors from Manning Park (three localities) and Skagit Valley. The trap-line about Egg Inlet on Fitzhugh Sound has produced a number of fisher probably of this race (McLeod, 1950).

Remarks.—The subspecies *Martes pennanti pacifica* (Rhoads) proves to be indistinguishable from *M.p. pennanti* (Hagmeier, op. cit.).

GENUS MUSTELA—WEASELS AND MINK

Short-tailed Weasel

Mustela erminea Linnæus

Description.—A small, slender, short-legged carnivore with a long, almost cylindrical, body. The tail is short, tipped with black, and usually under 4½ inches long (115 mm.) (Fig. 23 (*b*)). Head is small with a short rostrum and inconspicuous rounded ears. Pelage is short, dense, and fine, and is white in winter where low temperatures prevail. Summer pelage is brown above and white underneath, the amount of white varying greatly with individuals and geographic location. Males measure about 12 inches long, females are usually an inch or two shorter. The short-tailed weasel may be distinguished from the long-tailed weasel by a tail length of 115 mm. or less and a basilar length of skull less than 45 mm.

Habitat.—Found in a great variety of habitats, usually at lower elevations. Rock-slides, coniferous forest edge, deciduous forest,

Plate 73. Short-tailed Weasel, *Mustela erminea.*

grasslands, sea-beach debris, banks of streams and lakes, cultivated fields, and wherever small mammals and birds occur.

Biology.—Small birds and mammals are the chief food of this species. This weasel reaches sexual maturity at 1 year, bears from four to eight young (average six) in mid-April to early May; the period of gestation is about ten months.

SUBSPECIES

Mustela erminea anguinæ Hall

Hall, Univ. Calif. Publ. Zool., *38*:417, 1932. Type locality, French Creek, Vancouver Island, British Columbia.

Distinctions.—Unique in having both sexes about the same size. Very narrow white area on abdomen, basal part of lower surface of tail colour of abdomen; upper lips usually white; winter pelage usually brown; there are a number of distinctive cranial features.

Measurements.—Eight males measured: Total length 272 mm. (260–284); tail 80 mm. (74–82); hind foot 35 mm. (32–38). Three females measured: Total length 256 mm. (253–259); tail 75 mm. (73–78); hind foot 32 mm. (30–33).

Distribution. — Occurs on Vancouver Island, Saltspring and possibly on other gulf islands lying in close proximity to Vancouver Island. Introduced recently to North Pender Island. Specimen records from Cape Scott, Quatsino, Port Hardy, Bear River, Bear Lake, Sayward, Alberni, Cowichan Lake, Duncan, Saltspring Island.

Mustela erminea fallenda Hall

Hall, Journ. Mammal. *26*:79, 1945. Type locality, Huntingdon, British Columbia.

Distinctions.—Differs from *richardsoni* and *invicta* in having upper lip brown instead of white; in darker colour and in having dark colour extending on to abdomen so that white area is a narrow central strip; from *richardsoni* also in having hind foot of male less than 41 mm. and of female generally less than 29 mm. From *streatori, fallenda* differs in having black tail-tip more than half the length of the tail, and in males hind foot more than 33.7 mm. Winter colour rarely white. There are many cranial distinctions.

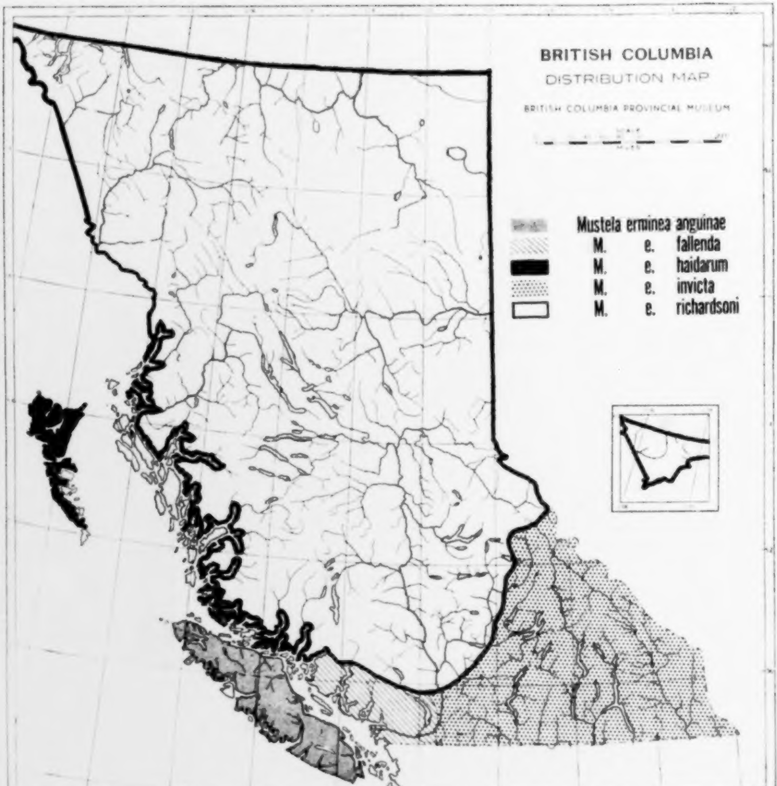
Measurements.—Ten males measured: Total length 278 mm. (250–305); tail 76 mm. (63–90); hind foot 38 mm. (33–41). Six females measured: Total length 236 mm. (225–256); tail 63 mm. (57–76); hind foot 29 mm. (27–31).

Distribution.—Occurs in British Columbia west of the Coast Range from the latitude of Powell River southwards. Specimen records from Horseshoe Lake, Stillwater, Vancouver, Port Moody, Chilliwack, Sumas, Cultus Lake, Vedder Crossing, Lihumitson Park, Huntingdon, Tamihi Creek.

Mustela erminea haidarum (Preble)

Preble, Proc. Biol. Soc. Wash. *12*:169, 1898. Type locality, Masset, Queen Charlotte Islands, British Columbia.

Distinctions.—The only weasel on the Queen Charlotte Islands. Distinguished by having proximal two-thirds of underside of tail


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Mustela erminea anguinae
M. e. fallenda
M. e. haidarum
M. e. invicta
M. e. richardsoni

Map 43. Distribution of the Short-tailed Weasel, *Mustela erminea*.

coloured like underparts. Differs from *fallenda* and *streatori* in having light colour of underparts more than half the width of the dark upper area; tail largely black.

Measurements.—Three adult males measured: Total length 280 mm. (275–290); tail 70 mm. (65–75); hind foot 39 mm. (37–40). Two females measured: Total length 250 and 252 mm.; tail 61 and 63 mm.; hind foot 31 and 32 mm.

Distribution.—Confined to the Queen Charlotte Islands. Specimen records from Graham and Moresby Islands.

Mustela erminea invicta Hall

Hall, Journ. Mammal. *26*:75, 1945. Type locality, Benewah, Benewah County, Idaho.

Distinctions.—Like a small *richardsoni* with white upper lip distinguishing it from *fallenda.* Distinguished from *richardsoni* by several cranial features, by smaller size, and whiter (less yellow) underparts.

Measurements.—Ten adults and sub-adults measured: Total length 291 mm. (272–328); tail 86 mm. (75–100); hind foot 40 mm. (38–44). Five adult and sub-adult females measured: Total length 255 mm. (245–270); tail 71 mm. (68–76); hind foot 32 mm. (32–33) (Hall, 1951).

Distribution.—Throughout southern British Columbia east of the Cascades, north at least to Yellowhead Pass area, intergrading with *richardsoni* across the south-eastern section of the Province and with *fallenda* in the Cascade Mountains. Specimen records from Grand Forks, Field, Glacier, Wentworth Lake, Revelstoke, Sicamous, Lumby, Okanagan, Manning Park, Hope, Chilliwack (on mountains).

Mustela erminea richardsoni Bonaparte

Bonaparte, Ann. Mag. Nat. Hist. *2*:38, 1838. Type locality, Fort Franklin, Mackenzie district, Northwest Territories.

Distinctions.—Differs from *fallenda* in larger size, in having upper lips white instead of brown, and with the hind foot of males greater than 41 mm. and that of the females greater than 29 mm.

Distinguished from *invicta* in several skull features, larger size, and yellower underparts. Sexual dimorphism in size is far greater in *richardsoni* than in any other subspecies of *erminea.*

Measurements.—Ten adult males measured: Total length 323 mm. (301–367); tail 98 mm. (90–115); hind foot 44 mm. (42–49). Ten adult females measured: Total length 252 mm. (234–265); tail 71 mm. (62–76); hind foot 34 mm. (32–38).

Distribution. — This subspecies occurs throughout northern British Columbia south to the latitude of Jasper Park on the eastern boundary, where it intergrades with *invicta* southwestwards to the range of *fallenda.* It occurs westwards to the coast in the regions north of Powell River, intergrading with *alascensis* in south-eastern Alaska north of the Portland Canal.

Specimen records from selected localities: Fort Halkett, Sheslay, Dorothy Lake, Fort Nelson, Telegraph Creek, Tuchodi Lake, Iskoot River, Fort Grahame, Laurier Pass, Omineca Mountains, Clearwater River, Kispiox Valley, Hazelton, Takla Lake, Babine Lake, Port Simpson, Metlakatla, Stuart Lake, Vanderhoof, Wistaria, Indianpoint Lake, Barkerville, Quesnel, Itcha Mountains, Anahim Lake, Rivers Inlet, Kingcome Inlet, Loughborough Inlet, Bute Inlet, McGillivray Creek, Pemberton Meadows, Alta Lake, Mons.

Remarks.—Mustela e. alascensis probably occurs in extreme north-eastern British Columbia.

Least Weasel

Mustela rixosa rixosa (Bangs)

Bangs, Proc. Biol. Soc. Wash. *10*:21, 1896. Type locality, Osler, Saskatchewan.

Description.—A diminutive weasel, smallest of its kind, conforming in general features to the other species but with much shorter tail in ratio to body length. Tail usually without black tip or with a few scattered black hairs (Fig. 23 (*a*)). Pelage in summer is a rich brown; completely white in winter. Males measure up to 8 inches long, females 6 inches.

Distinctions.—The small size and very short tail without black tip serves to distinguish this weasel from all others.

Measurements.—Two adult males from Ootsa Lake measured: Total length 189.5 mm. (189–190); tail 33.5 mm. (32–35); hind foot 23 mm.

Habitat. — In British Columbia parkland-type habitat has yielded the known records. Elsewhere on its range it occurs in a variety of habitats, such as stubble-fields, grasslands, and deciduous forest.

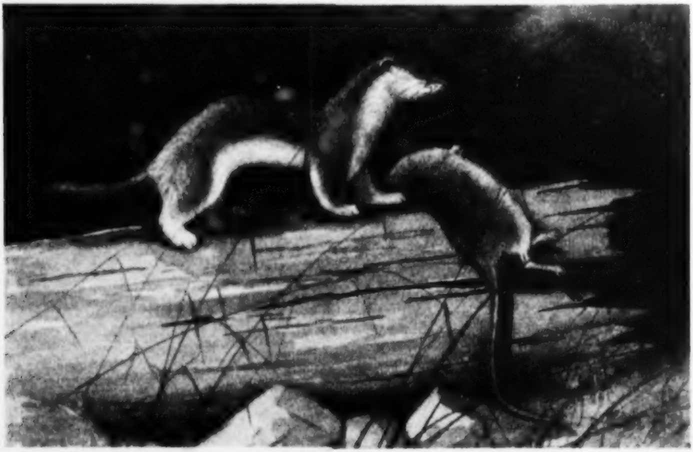


Plate 74. Least Weasel, *Mustela rixosa.*

Biology.—Food consists largely of *Microtus* and probably small birds, amphibians, and reptiles when such are available. Young, three to ten, average five, born any time of the year (Hall, 1951), very often during the late winter months. Young are born in nests constructed in underground dens or hay-piles. Mouse nests and burrows are often utilized and heavily lined with fine grass or mouse-fur.

Distribution.—Sparsely distributed in the northern and central sections of the Province. Fifteen miles east of Atlin, Clark's ranch at Halfway River in the Peace River District, Wistaria, Ootsa Lake, and Vanderhoof (Munro, 1955) are the only localities where specimens have been taken. The animal is not plentiful anywhere on its range.

Plate 75. Long-tailed Weasel, *Mustela frenata*.

Long-tailed Weasel

Mustela frenata Lichtenstein

Description.—A weasel resembling the ermine but larger and with a longer tail. Adult males measure up to 18 inches in total length, females usually about 2 inches shorter. Pelage is somewhat coarser than that of the ermines. In summer this weasel varies from light yellowish-brown to dark cinnamon brown above; white, cream, or yellow to orange below, depending upon individual variation and geographic race. Winter pelage is white, sometimes yellowish as though stained. Tail-tip is black the year around.

Size and a tail length greater than 4½ inches (Fig. 23 (*c*)) and a basilar length of skull between 45 and 55 mm. serve to distinguish this animal from the other weasels and from the mink.

Habitats.—The long-tailed weasel is a versatile animal, found from sea-level to mountain-top in almost every terrestrial habitat. In British Columbia it frequents river-banks, lake-shores, rock-slides, forest edge, and prairie lands where groundsquirrels, mice, pikas, and other small mammals and birds occur.

Biology.—Food consists largely of small mammals and birds. Young, four to eight, born in April.

SUBSPECIES

Mustela frenata altifrontalis Hall

Hall, Carnegie Inst. of Wash., Publ. No. 473:94, 1936. Type locality, Tillamook, Tillamook County, Oregon.

Distinctions.—This animal is characterized by large size, yellow to orange underparts, except for the chin, which is white, and by a brown spot at the corner of the mouth. The pelage in summer is dark brown above; the yellow of the underparts does not extend down the underside of the tail or beyond the knee of the hind leg.

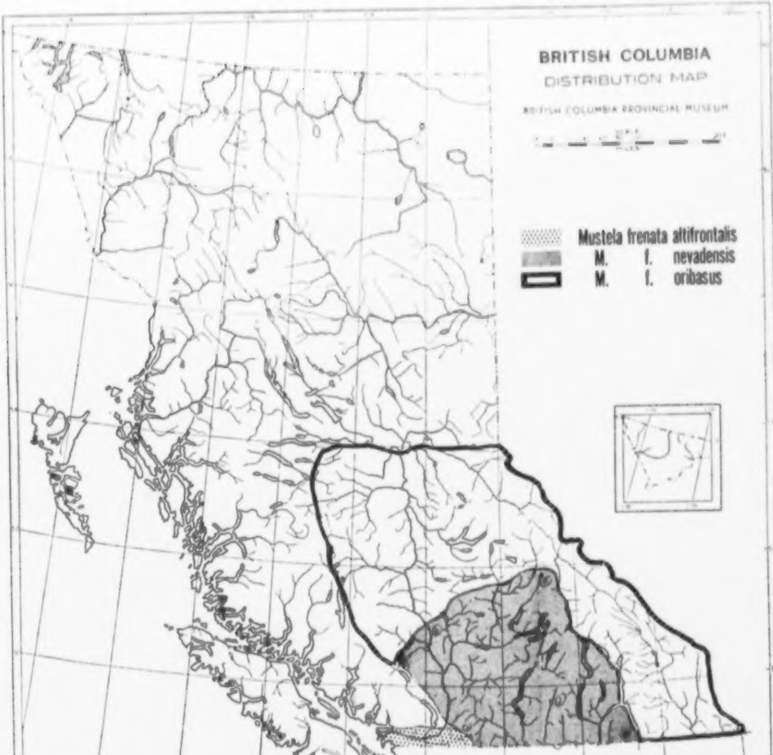
Measurements.—Eight adult male topotypes measured: Total length 426 mm. (392–445); tail 160 mm. (148–170); hind foot 47 mm. (42–53). Five adult females measured: Total length 347 mm. (320–370); tail 125 mm. (114–131); hind foot 38 mm. (35–44) (after Hall, 1951).

Distribution.—This subspecies occupies the extreme southwestern corner of the Province, from the 121st meridian west to the coast and north to Harrison Lake. Specimen records from Vedder Crossing, Cultus Lake, Lihumitson Park, Chilliwack.

Mustela frenata nevadensis Hall

Hall, Carnegie Inst. of Wash. Publ. No. 473:91, 1936. Type locality, 3 miles east of Baker, White Pine County, Nevada.

Distinctions.—Smaller in size but similar in colour to *oribasus* and with distinguishing skull characteristics. Distinguished from


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Mustela frenata altifrontalis
M. f. nevadensis
M. f. oribasus

Map 44. Distribution of the Long-tailed Weasel, *Mustela frenata.*

altifrontalis by extension of yellow underside colour to the forefeet and along the underside of the tail.

Measurements.—Hall (1951) lists the means and extremes of twenty-one adult males from California as: Total length 400 mm. (356–428); tail 150 mm. (125–178); hind foot 46 mm. (42–50). Ten adult females from the same region measured: Total length 349 mm. (336–362); tail 127 mm. (120–133); hind foot 36 mm. (32–39).

Distribution.—This subspecies occurs from the Cascade Range, where it intergrades with *altifrontalis,* east to Kootenay Lake, and north almost to the 52nd parallel of latitude. At the northern extremities of its range intergradation with the following race *oribasus* occurs. Specimen records from Kamloops (20 miles east), Sicamous, Okanagan, Monashee Pass, Okanagan Landing (Swan Lake), Anarchist Mountain, Osoyoos, Vernon, Nelson, Rossland, Hope, Princeton.

Mustela frenata oribasus (Bangs)

Bangs, Proc. New England Zool. Club *1*:81, 1899. Type locality, source of the Kettle River, British Columbia.

Distinctions.—Differs from the foregoing subspecies mainly in different skull characteristics and in greater size. From *altifrontalis* it differs in the yellow of the underparts extending along the underside of the tail over two-thirds of its length and to the upper surfaces of the paws.

Measurements.—Four adult males from central British Columbia measured: Total length 461 mm. (443–485); tail 175 mm. (168–186); hind foot 56 mm. (50–60). Five females from the same general area measured: Total length 420 mm. (393–440); tail 152 mm. (142–165); hind foot 49 mm. (46–51).

Distribution.—This subspecies occupies an area in British Columbia extending from Kootenay Lake east to the Alberta boundary, north to the 54th parallel, west to the 125th meridian, and south and west to the vicinity of Chilko Lake. It intergrades with *altifrontalis* in the vicinity of Lillooet Lake, and with *nevadensis* along the south and western extremities of its range.

Specimen records from Wistaria, Quesnel, Lillooet, Mount Revelstoke, Okokolex River, Chezacut, Paradise Mine, Wells Gray Park.

Plate 76. Mink, *Mustela vison.*

Mink

Mustela vison Schreber

Description.—A dark-brown weasel-like animal. Males weigh up to 3 pounds, females about half that. The male measures about 2 feet in length, including a moderately bushy tail of 7 or 8 inches. The legs are short, head flattened, and somewhat triangular in shape. The nose is short, and the eyes small but prominent; the ear is not large, but is noticeable at close range. The pelage is glossy brown, dense and fine, with irregular patches of white on the throat and sometimes on other portions of the underparts. Anal musk glands are well developed. The mink is distinguished from the martens by thirty-four rather than thirty-eight teeth, less prominent ears, shorter legs, bullet-like head, shorter and less bushy tail, sleek rather than fluffy pelage; from the weasels by larger size, more uniform colour throughout the year, shorter tail with no black tip; and from the otter by thirty-four rather than thirty-six teeth, much smaller size, shorter tail, and unwebbed toes.

Habitat.—Semi aquatic in habit, the mink is usually found associated with water. It dwells in the woodlands and marshes surrounding sea-shores, banks of rivers, lakes, and streams.

Biology. — The mink is an excellent swimmer and subsists largely upon fish, amphibians, and reptiles around the fresh-water habitat. Birds and mammals, especially muskrats and voles, are also captured and eaten. Coastal mink subsist largely upon marine crustaceans, notably crabs. Depredations by mink on domestic fowl are not uncommon. The female matures at 1 year of age, males at 18 months, breeding takes place in March; young, three to ten, are born after a gestation period of six weeks. Young are born in natural recesses or in burrows of other animals.

SUBSPECIES

Mustela vison energumenos (Bangs)

Bangs, Proc. Boston Soc. Nat. Hist. *27*:5, 1896. Type locality, Sumas, British Columbia.

Distinctions.—Relatively small and dark compared to adjacent subspecies. From the only other subspecies of mink occurring in British Columbia, *evagor,* it is distinguished by smaller size, darker colour, and smaller teeth.

Measurements.—Seven adult males from southern British Columbia measured: Total length 524 mm. (467–596); tail 174 mm. (156–195); hind foot 60 mm. (53–66).

Distribution.—Throughout the mainland and coastal islands of British Columbia except Vancouver Island, where the subspecies *evagor* occurs. Specimen records from Atlin, Bennett Lake, Omineca River, Tetana Lake, Driftwood River, Bear Lake, Quick, Wistaria, Indianpoint Lake, Chilcotin River, Chezacut, Bella Coola, Bella Bella, Stuart Island, Atnarko, Lempriere, Revelstoke, Eagle River, Okanagan Landing, Kettle Valley, Kingcome Inlet, Princess Royal Island, Price Island, Broughton Island, Mons, Alta Lake, Green Lake, Hope, Vedder Crossing, North Vancouver, Vancouver, Cultus Lake, Akamina Creek.

Mustela vison evagor Hall

Hall, Univ. Calif. Publ. Zool. *38*:418, 1932. Type locality, Little Qualicum River, Vancouver Island, British Columbia.

Distinctions.—Larger, paler in colour than the preceding subspecies, and with larger teeth and differences in skull measurements.

Measurements.—Eight adult males from the east side of Vancouver Island measured: Total length 605 mm. (540–646); tail 186 mm. (161–200); hind foot 78 mm. (64–82). Two adult males from the west side of the island weighed 4 pounds 4 ounces and 3 pounds even.

Distribution.—Generally distributed on and confined to Vancouver Island but introduced to Lanz Island by trappers. Now well established on Lanz Island and possibly on adjacent Cox Island. Specimen records from selected localities: Port McNeill, Port Hardy, Cluxewe River, Englewood, Comox, Little Qualicum River, Quatsino, Tofino, Alberni, Stamp River, French Creek, Nanaimo, Chemainus, Cowichan Lake, Cowichan River, Malahat summit, Victoria, Sooke.

GENUS GULO—WOLVERINES

Wolverine

Gulo luscus (Linnæus)

Description.—A powerful, long-haired mustelid somewhat resembling a small short-legged bear. Males measure up to 42 inches in total length and weigh about 30 pounds; females are slightly smaller. The head is broad and short-snouted, legs are short and very sturdy, body robust, tail short and bushy. Pelage is long, thick, and varies in texture and colour with the individual. Usually dark brown above with pale lateral stripes running from shoulder to rump and merging posteriorly to extend down the proximal half of the tail. Underparts are dark, often with irregular white or orange markings at the throat.

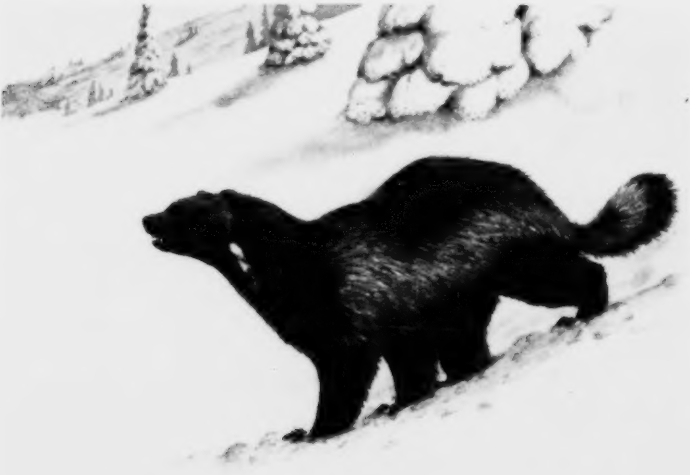


Plate 77. Wolverine, *Gulo luscus*.

Habitat.—The wolverine is a creature of the northern wilderness frequenting wooded and mountainous areas. In the summer months it often ranges high in the sub-alpine forest foraging about timber-line and talus slopes.

Biology.—Food mainly flesh of birds and mammals. Known to attack smaller mammals, such as groundsquirrels, marmots, and beaver. There are also authentic records of attacks upon mountain goat, moose, deer, and caribou. On the big-game ranges it subsists upon winter kills and the kills of other predators. The depredations by wolverine upon trappers' food-caches and trap-lines are well known. It is said that berries also form a part of the diet.

Young, one to five, born from April through June after a gestation period of sixty days (Asdell, 1936). Young are born in dens, usually in natural caves, in rock-slides, or under the roots of trees or windfalls.

Gulo luscus luscus (Linnæus)

Linnæus, Syst. Nat., ed. 10, *1*:57, 1758. Type locality, Hudson Bay, Canada.

Distinctions.—Larger and averaging paler than *vancouverensis*.

Measurements.—Two adult males from near the British Columbia boundary at Jasper and Banff, Alberta, measured: Total length 37 inches, 39 inches; tail 8 inches, 9½ inches; hind foot 7 inches, 7½ inches; the larger animal weighed an estimated 45 pounds.

Distribution. — Throughout the Province in the mountainous areas, uncommon on the coast proper but found in the high country of the Coast Range. Specimen records from Telegraph Creek, Iskut River, Skeena River (McLasko Lake), Bella Coola, East Pine, Indianpoint Lake, McClary Lake, Murtle Lake, Blue River, Horsefly River, 40 miles north of Revelstoke, St. Mary Lake near Cranbrook, Nelson.

Gulo luscus vancouverensis Goldman

Goldman, Proc. Biol. Soc. Wash. *48*:177, 1935. Type locality, Great Central Lake, Vancouver Island, British Columbia.

Distinctions.—Like the preceding subspecies but smaller and darker in colour. The light markings on the sides, back, and tail are brown rather than yellow in the few skins we have examined, but a similar dark phase occurs sporadically in mainland populations. The small number of skins available make accurate description of this race impossible. It was described on the basis of insularity and the skull measurements of only two specimens. Until an adequate series is collected, colour variations and size range remain unknown.

Measurements.—Two adult females from the east coast of Vancouver Island measured: Total length 36 and 34 iches; tail 9 and 8 inches; hind foot 6.5 and 6.4 inches; weight 19 pounds 8 ounces and 14 pounds 13 ounces.

Distribution. — Confined to Vancouver Island. Specimen records from Nootka Sound, Zeballos, Tsable River, Cowichan Lake, Cameron River, Great Central Lake, Fanny Bay, Jordan Meadows, Shawnigan Lake.

GENUS TAXIDEA—BADGERS

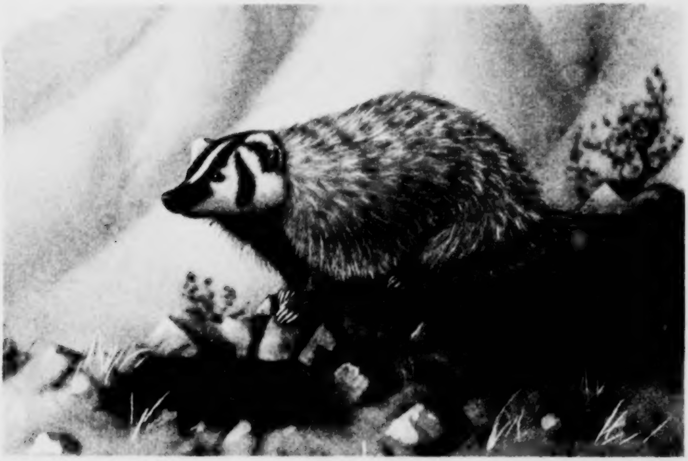


Plate 78. Yellow Badger, *Taxidea taxus.*

Yellow Badger

Taxidea taxus taxus (Schreber)

Schreber, Die Saugethiere *3*:520, 1788. Type locality, Labrador and Hudson Bay.

Description.—A medium-sized carnivore, adult males about 30 inches in total length including the tail of 6 inches. Females are somewhat smaller. The pelage on the body is long and yellowish, silvery grey above, lighter below. The head is small, triangular in shape, and with prominent rounded lateral ears. The tail is short and bushy. A narrow white stripe runs from muzzle to shoulder and white crescent-shaped markings are present below the eye and ahead of the ear. The remainder of face is dark brown. The legs are short and powerful; the forefeet with very long claws developed for digging.

Measurements.—Four males measured: Total length 801 mm. (32 inches) (775–845); tail 142 mm. (5⅝ inches) (130–157); hind foot 125 mm. (5 inches) (123–130). Two of these weighed 22 and 30 pounds.

Habitat.—Prairie lands and open forest where groundsquirrels occur. The badger lives in or close to burrows by day but is much more venturesome in the evening and night.

Biology.—Food largely groundsquirrels, which are secured by digging. Mice, insects, and probably birds and their eggs form part of the diet. Young, two to five, usually three, born in May and June. In areas of extreme cold the badger hibernates during the winter months.

Distribution.—Southern British Columbia as far north as Deep Creek near Williams Lake. Specimens examined from Deep Creek, Black Pines, Kamloops, Anarchist Mountain, Invermere, Newgate.

GENUS SPILOGALE—SPOTTED SKUNKS

Spotted Skunk

Spilogale gracilis latifrons Merriam

Merriam, North Amer. Fauna *4*:15, 1890. Type locality, Roseburg, Douglas County, Oregon.

Description.—A small black and white carnivore about 20 inches long including the tail of 6 inches. The body fur is short and fine, the tail hairs long. This small skunk is black in colour with a pattern of white lines, spots, and irregular markings along the back from the head to the tail. The latter is black, usually tipped with white. Legs are slender and of moderate length, feet small and long-clawed. Head small, triangular, with small but prominent ears. The anal glands produce a strong-smelling oil that can be ejected to a distance of several feet.

Measurements.—Thirteen males measured: Total length 403 mm. (370–434); tail 128 mm. (110–140); hind foot 48 mm.

(44–52). Seven females are, respectively, 378 mm. (368–383); 122 mm. (104–148); 44 mm. (41–47). Weight from 1 to 1½ pounds.

Habitat.—Lowland thickets and heavy cover, occasionally taking up residence in abandoned buildings and rock-slides.

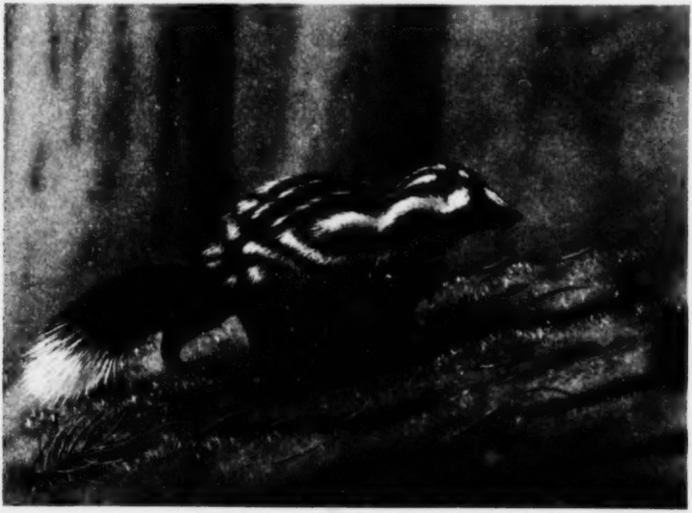


Plate 79. Spotted Skunk, *Spilogale gracilis.*

Biology.—Strictly nocturnal, remaining in underground burrows by day. Food—mice, birds, amphibians, reptiles, insects, and occasionally fruit. Young, four or five, born in the spring; breeding season and period of gestation unknown.

Distribution.—In British Columbia occurs in the Puget Sound Lowlands northward to the summit of the Coast Range at Alta Lake. Specimens examined from Alta Lake, North Vancouver, Huntingdon, Dollarton, New Westminster, Vancouver.

Plate 80. Striped Skunk, *Mephitis mephitis*.

Striped Skunk

Mephitis mephitis (Schreber)

Description.—A black and white striped carnivore, adults measuring about 28 inches including a very bushy tail of some 10 or 11 inches. Weights of adults vary greatly with location, food conditions, and individuals. The head is sharply pointed, with short ear pinna; the legs short, forefeet armed with long claws. The pelage is long and silky, black in colour with a white stripe on the face; a broad stripe from nape to shoulder, forking there to form two stripes which extend to the hind quarters. The stripes usually end at the base of the tail, which may be black or have more or less white in it. The anal glands are highly developed and produce a volatile oil with acrid odour characteristic of these mammals.

Habitat.—Open fields, marshes, and streamside thickets mixed with dense cover are the favoured haunts of this animal in British

Columbia. Dens are excavated, or it may use burrows of other mammals such as muskrat and marmot. It often takes up residence under the floors of buildings.

Biology.—The striped skunk is largely nocturnal and omnivorous, eating rodents, birds and their eggs, insects, amphibians, reptiles, mammals, fruit, and carrion. It breeds in February, and the young, four to eight, sometimes ten, are born in the underground dens after a gestation period of sixty-three days.

SUBSPECIES

Mephitis mephitis hudsonica Richardson

Richardson, Fauna Boreali Americana *1*:55, 1829. Type locality, "plains of the Saskatchewan, Canada."

Distinctions.—Very similar to the next subspecies, with narrower white stripes and certain distinctive cranial features.

Measurements.—Four adults from the Okanagan and Cariboo Districts measured: Total length 698 mm. (675–755); tail 236 mm. (230–245); hind foot 90 mm. (85–94).

Distribution.—The entire Province east of the Coast Range and north at least to the Liard River (Rand, 1944). Specimens examined from Tetana Lake, Bear Lake, Chezacut Lake, Lonesome Lake, Indianpoint Lake and vicinity, Big Bar Lake, Lac la Hache, Okanagan Landing.

Mephitis mephitis spissigrada Bangs

Bangs, Proc. Biol. Soc. Wash. *12*:31, 1898. Type locality, Sumas Prairie, British Columbia.

Distinctions.—Similar to *hudsonica* but with more extensive stripes and some distinctive cranial features.

Measurements.—Four young adults measured: Total length 595 mm. (575–637); tail 267 mm. (215–260); hind foot 73 mm. (70–75).

Distribution.—Confined to the Puget Sound Lowlands Biotic Area. Specimens from Nicomen Island and Huntingdon.

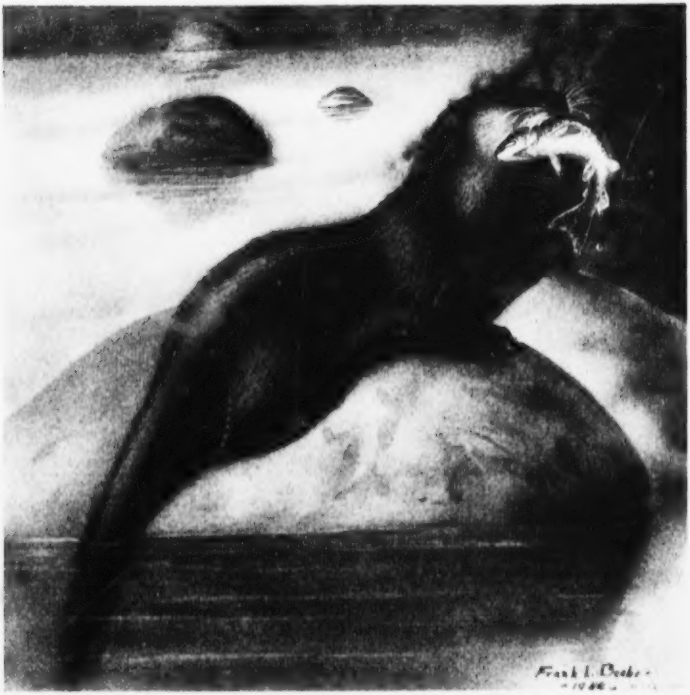


Plate 81. Canadian River Otter, *Lutra canadensis.*

Canadian River Otter

Lutra canadensis (Schreber)

Description.—A long lithe-bodied mustelid, adult males sometimes measuring over 4 feet in total length including a tapered muscular tail of 16 to 20 inches. Weight up to 30 pounds. Females somewhat smaller. Head is broad and flat with small ear pinna and small eyes. Legs are short, muscular; feet with all five toes fully webbed. Pelage is short, very dense, and usually dark brown above, lighter below.

Habitat.—Associated with the larger waterways throughout the Province and with the shore-lines of the Pacific Ocean. The river otter fishes, travels, and plays in water but resides on land, usually in dens under the roots of large trees, or in slab rock close to the water. On the coast the preferred ecological niches almost invariably have a fresh-water pond or stream associated with them. River otters forage the shores, leaving ample evidence of their presence in the form of well-defined trails and droppings laced with the remains of fish and crustaceans. They are an abundant mammal along the coast and among the offshore archipelagos; inland they are very rare. In Vancouver harbour and along the Gorge at Victoria they are the most numerous aquatic mammal.

Biology.—In fresh water the food consists mainly of fish, which are taken easily in direct underwater pursuit. River otters living along the sea-shores, however, feed largely upon crabs. Birds and mammals are occasionally taken. Young, one to five, usually three, born in March and April after a gestation of about two months. One in captivity in Vancouver gave birth after a maximum gestation of forty-three days.

Otters have a highly developed sense of direction; a semi-tame pair taken from Victoria harbour to Stanley Park Zoo in Vancouver escaped and three weeks later were back in their old haunts in Victoria. The minimum distance involved is 70 miles with a minimum water crossing of 15 miles. They are playful and affectionate creatures; the propensity to use slides in the snow or on clay banks leading to the water is well known.

Lutra canadensis evexa Goldman

Goldman, Proc. Biol. Soc. Wash. *48*:182, 1935. Type locality, Stuart Lake, British Columbia.

Distinctions.—Only the cranial characteristics of this race are described. In these, *evexa* resembles *pacifica* but is slightly smaller, with more flattened rostrum, deeper brain case, more inflated bullæ, and smaller teeth. Supposedly smaller and paler than the next.

Measurements.—No external measurements are known.

Distribution.—This subspecies occupies the western slopes of the Rocky Mountains in central British Columbia. The exact limits of the range are unknown. Specimen records from Driftwood River, Driftwood Lake, Bear Lake, Chezacut, Meldrum Creek, Ben Lake, Ahbau Lake, Indianpoint Lake, North Fork of Eagle River, Kettle Valley.

Lutra canadensis pacifica Rhoads

Rhoads, Trans. Amer. Philos. Soc. *19*:429, 1898. Type locality, Lake Keechelus, Kittitas County, Washington.

Distinctions.—Larger, and darker above than the preceding subspecies and with distinctly lighter underparts. Skull larger and more massive with many related features serve to distinguish it from that of *evexa.*

Measurements. — Two males measured: Total length 1,020 and 1,244 mm. (41 and 49 inches); tail 410 and 480 mm. (16½ and 19 inches); hind foot 122 and 130 mm. (5 inches); weights 21 and 23 pounds. One female from Parksville measured: Total length 1,219 mm. (41 inches); tail 495 mm. (20 inches); hind foot 127 mm. (5 inches); weight 24 pounds.

Distribution. — This subspecies occupies the mainland coast west of the Cascade Mountains and the adjacent islands, except for Queen Charlotte Islands. Specimen records from Stuie, Bella Bella, Bella Coola River, Alberni, Bamfield, Eden Island, Sooke, Langford, Victoria, Anvil Island, Lulu Island, Stave Lake, Vancouver.

Remarks.—The material now available does not support Goldman's (1935:186) recognition of the Vancouver Island population as distinct from that of the mainland. We accordingly place *Lutra vancouverensis* Goldman in synonomy with *Lutra canadensis pacifica* (Rhoads). We have conclusive experimental proof of otters travelling from Vancouver to Victoria across the widest part of the Strait of Georgia.

Lutra canadensis periclyzomæ Elliot

Elliot, Proc. Biol. Soc. Wash. *18*:80, 1905. Type locality, Garvi, Moresby Island, Queen Charlotte Islands, British Columbia.

Distinctions.—Described as larger and darker than the preceding subspecies, but the validity of this subspecies is not yet established. Four entire specimens taken by us do not differ in size and colour from otters inhabiting the salt water elsewhere along the coast of British Columbia. There are not sufficient specimens to evaluate the supposed differences in skull.

Measurements.—Two males from Graham Island measured: Total length 1,245 and 1,312 mm. (49 and 52½ inches); tail 490 and 503 mm. (19½ and 20 inches); hind foot 157 and 153 mm. (6 inches). Two females: Total length 1,118 and 1,120 mm. (45 inches); tail 420 and 424 mm. (17 inches); hind foot 125 and 133 mm. (5 and 5½ inches). One male weighed 27 pounds.

Distribution.—This subspecies is confined to the Queen Charlotte Islands—Sangan River, Henslung Bay, Peril Bay, Cape Knox.

GENUS ENHYDRA—SEA OTTERS

Sea Otter

Enhydra lutris lutris (Linnæus)

Description.—A large marine otter, adults measuring up to 5 feet in total length and weighing between 50 and 80 pounds (Jones, 1951). The tail is short and thick and measures about 10 inches in length. The head is broad and flat with inconspicuous ear pinna and small eyes; seal-like whiskers are present. The legs are short and powerful; hind feet fully webbed, flipper-like, and furred on both surfaces. Pelage is very dense and of medium length, with light-coloured guard hairs giving a grizzled appearance to the fur. Colour characteristics vary with age and possibly with sex. Two skins at Provincial Museum are totally different in colour—one is very dark brown throughout with a scattering of light-tipped guard hairs, while the other is yellowish-grey and paler about the muzzle and shoulders. At all ages the head fur is usually lighter in colour than the rest of the body.

Measurements.—None available from Canadian waters.

Habitat. — Offshore kelp-beds, rocky islets, and reefs of the Pacific Ocean. Lives almost entirely in the sea.

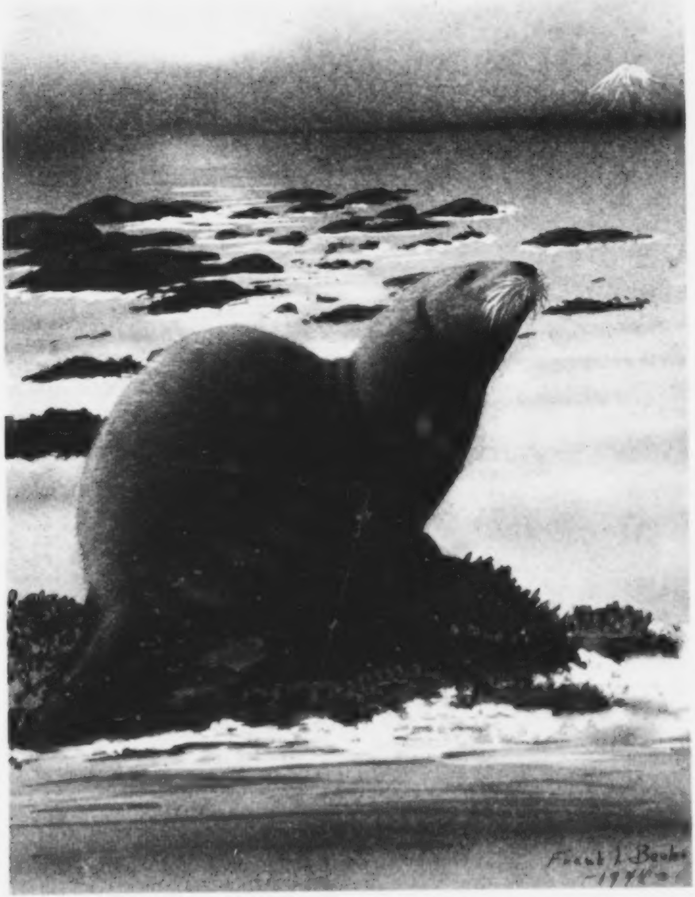

Frank L. Beebe

Plate 82. Sea Otter, *Enhydra lutris*.

Biology.—Food consists largely of sea urchins and molluscs, which are secured by diving. Upon surfacing the sea otter lies on its back to feed, breaking the shell with its jaws. According to Jones (op. cit.), only older animals with worn teeth are likely to use the paw for cracking shells upon their chest. He makes no mention of the sea otter using a stone for this purpose. Young, one, born at sea in the kelp-beds. The mating season and period of gestation are unknown, but most young appear to be born in April and May. Sexual maturity is probably attained at 3 years of age. The females with young remain apart from " pods " of males and immature females during the summer, but rejoin these groups during the winter. Nothing definite is known of the life-span of sea-otters, but Russian workers cite two examples of 8 years or older.

The female is very solicitous of her young one, which weighs about 4 pounds at birth and is covered with a very buoyant brownish-coloured fur. When pursued the mother seizes the young and hauls it under, much as female hair seals do. Apart from man, the killer whale is the only predator of any consequence.

Distribution.—At one time inhabited the entire length of the British Columbia coast. Recent records are from Grassie Island, Kyuquot (1929), Nootka Island (November 15th, 1909); fragmentary material from Indian camp-sites and " pick-ups " include Rose Spit, Tofino, Virago Sound, Alberni.

FAMILY FELIDÆ

GENUS FELIS—LONG-TAILED CATS

Cougar or Mountain Lion

Felis concolor Kerr

Description.—A large unspotted cat; adult males measure up to 9 feet in total length including the tail of 30 inches. The weight is up to 180 pounds in the interior parts of the Province. Females are smaller. The fur is short; the animal occurs in a red and grey phase, in each of which the summer pelage is brighter or more reddish-brown, lighter below, and the winter pelage duller. The body is long and lithe, with head and ears proportionately small

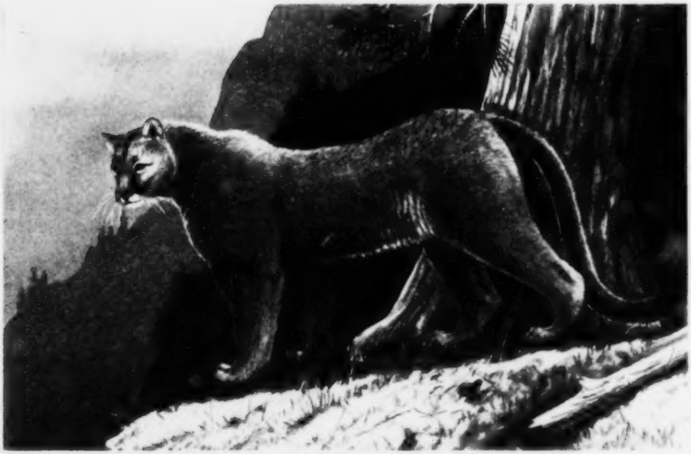
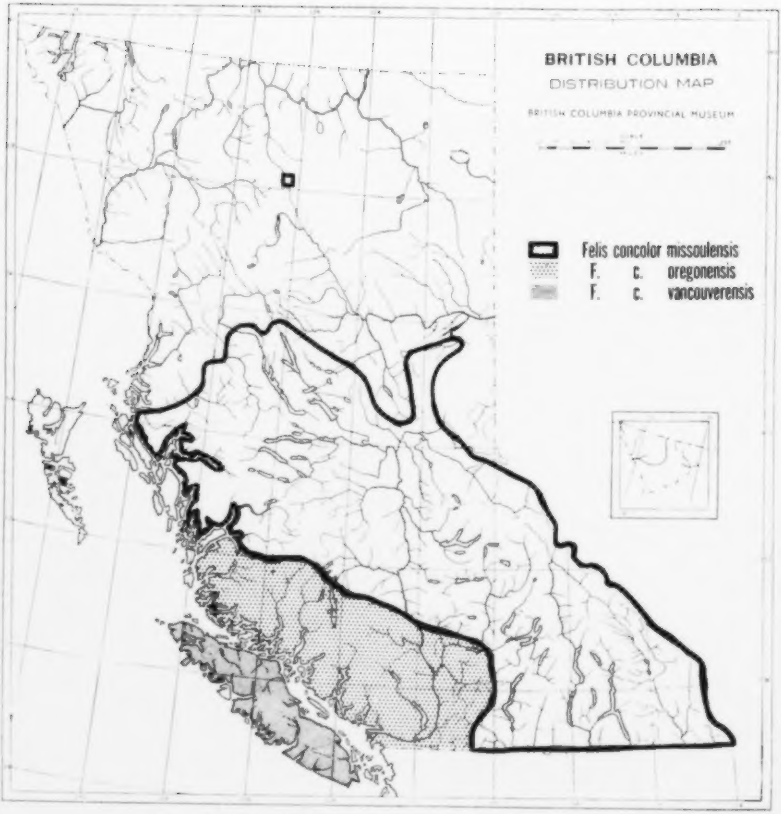


Plate 83. Cougar or Mountain Lion, *Felis concolor*.

and typically cat-like. The long, powerful legs bear five toes in front, four behind, armed with long retractile claws. The cylindrical tail is coloured like the body and has a dark tip. The kittens are spotted.

Habitat.—In British Columbia this animal frequents the ranges of large ungulates, principally those of deer. It remains in the cover, usually lying up by day and hunting during the hours of twilight and darkness. The cougar travels over a long range and is consequently reported from varied ecological types, such as slash, mature forest, and second growth, but it favours rocky and mountainous terrain.

Biology.—Food largely deer. Wapiti, moose, goats, domestic stock, and other large ungulates are utilized, as well as rabbits, birds, and smaller wildlife. Attacks on man are rare, but there are three recent authentic instances on Vancouver Island. One to four young are born in a natural windfall or recess in the rocks. The cougar has no fixed breeding season, and young are born at any time of the year after a gestation period of about ninety days. The species is polygamous, and only the female tends the young.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Felis concolor missoulensis
F. c. oregonensis
F. c. vancouverensis

Map 45. Distribution of the Cougar, *Felis concolor*.

Felis conclor missoulensis Goldman

Goldman, Journ. Mammal. *24*:229, 1943. Type locality, Sleeman Creek, 10 miles south-west of Missoula, Missoula County, Montana.

Distinctions.—Larger in size and paler in colour than *oregonensis* of the Cascade Range and coastal slope of the Province, and with a shorter, broader, and more flattened skull.

Measurement.—Great differences occur with age and individual. Fourteen adult males measured: Total length 95 inches (81–110); tail 35 inches (30–36); hind foot 12½ inches (12–13½); weight 160 pounds (125–178). Seven adult females measured: Total length 81 inches (77–84); tail 31 inches (28–33); hind foot 11 inches (11–11½); weight 102 pounds (90–115).

Distribution.—This is presumed to be the race of all the interior mountain ranges, but its approximate western boundary and details of its intergradations with *oregonensis* are not known. Rare north of the 54th parallel of latitude. Specimens examined from Crowsnest Pass, Cranbrook, Invermere, Kootenay Crossing, Nelson, East Pine. Rand (1944) records a cougar taken at Big Muddy River on the Alaska Highway. This seems to be the most northerly record of occurrence.

Felis concolor oregonensis Rafinesque

Rafinesque, Atlantic Journal, *1*:62, 1832. Type locality, northwest coast of United States.

Distinctions.—Darker and more reddish than *missoulensis* and with longer, narrower, more arched skull.

Measurements.—Eight adult males measured: Total length 83 inches (76–96); tail 31 inches (26–33); hind foot 11 inches (10½–12); weight 123 pounds (95–175). Six adult females measured: Total length 77 inches (72–81); tail 28 inches (23–32); hind foot 10½ inches (9½–11); weight 101 pounds (93–110).

Distribution.—The Coast Range and coastal slope from the southern boundary north at least to the Bella Coola Valley. Specimens examined from North Vancouver, Mission, Vedder Crossing, Princeton, Skagit River, Ashnola River, Kamloops, Texas Creek, Nelson Island, Jervis Inlet.

Felis concolor vancouverensis Nelson and Goldman

Nelson and Goldman, Proc. Biol. Soc. Wash. *45*:105, 1932. Type locality, Campbell Lake, Vancouver Island, British Columbia.

Distinctions.—Like *oregonensis* but darker in colour, and red phase distinctly darker and more richly coloured. Skull with highly arched frontal region and deeply indented frontonasal pit.

Measurements.—Six adult males measured: Total length 76 inches (73½–81); tail 30 inches (29½–31); hind foot 11¾ inches (11½–12¼); weight 116 pounds (90–142). Three adult females measured: Total length 72 inches (69–73); tail 28½ inches (28–29); hind foot 11½ inches (11½–12); weight 81 pounds (63–96).

Distribution.—The entire length of Vancouver Island, occasional on Saltspring Island and Quadra Island. Representative localities: Port Hardy, Quatsino, Zeballos, Iron River, Campbell River, Quinsam River, Courtenay, Alberni, Youbou, Duncan, Victoria, Saanich Peninsula, Albert Head, Becher Bay, Sooke, Jordan River, Port Renfrew.

GENUS LYNX—BOBCATS AND LYNX

Bobcat or Bay Lynx

Lynx rufus (Schreber)

Description. — A medium-sized cat resembling the lynx but smaller, with shorter hair and more prominent markings. The feet are small and black underneath; the tip of the tail is black only on top and is preceded by one or two black bars. The backs of the ears are also black, but each is usually marked with a distinct grey spot. Ear tufts are reduced or lacking. The general body colour is greyish or reddish-brown above with an indistinct dark central line and spotting on the sides and down the legs. The underparts are light buff to white and are clearly marked with black bars and spots. The shape of the presphenoid bone is diagnostic (Fig. 25).

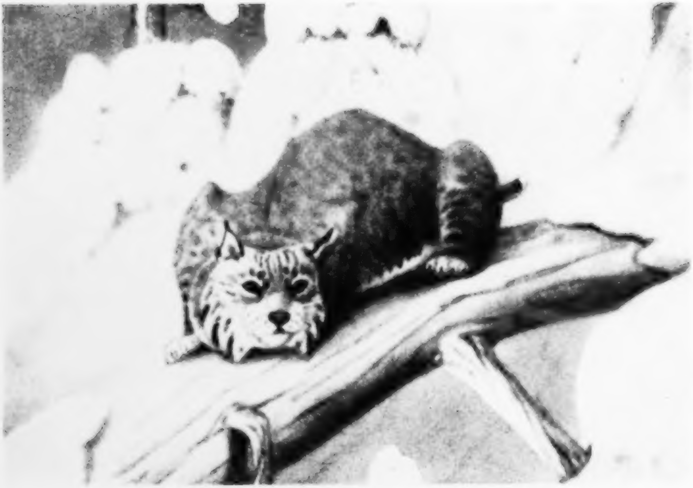


Plate 84. Bobcat or Bay Lynx, *Lynx rufus.*

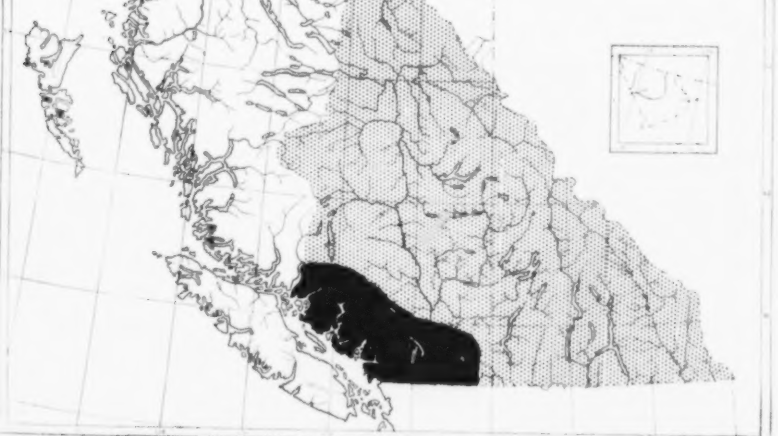
Habitat.—Bobcats are versatile creatures and may be found in a variety of habitats from valley-bottom to timber-line. The habitat preference of these animals in British Columbia, however, appears to be at lower elevations, where mixed cover prevails.

Biology.—Small mammals, such as hares, groundsquirrels, and birds, make up a large part of the bobcat's diet, but authentic accounts of attacks on young or even adults of the large ungulates have been reported. Young, one to four, usually born in April and May after a gestation period of about fifty days. Bobcats, however, may bear young at any season in the southern parts of the range. Young are born in a natural cave, in rock-slides, or in windfalls.

Lynx rufus fasciatus Rafinesque

Rafinesque, Amer. Monthly Mag. 2:46, 1817. Type locality, "north-west coast," probably near mouth of Columbia River.

Distinctions.—So much darker and redder than *L.r. pallescens* that no other criterion is needed to separate the two.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
■ Lynx rufus fasciatus
▨ L. r. pallescens

Map 46. Distribution of the Bobcat, *Lynx rufus*.

Measurements.—Mean and extreme measurements of six adults (males) are: Total length 35.7 inches (29–37); tail 6.8 inches (5.8–7.9); hind foot 7 inches (6.5–7.7). Four adult females measured: Total length 29.4 inches (28.5–30); tail 5.6 inches (5.4–6); hind foot 6.6 inches (5.9–7.1). Two males from the Cheakamus River averaged 20 pounds (18–22½).

Distribution.—Confined in and west of the Coast Range, north to Bute Inlet, east to the Similkameen Valley, and south along the Cascade Mountains to California. In British Columbia it intergrades with *L.r. pallescens* along the eastern and northern limits of its range. Specimen records from Mons, Brigade Lake, Alta Lake, Sproat Mountain, Cheakamus River, Skagit River, Manning Park, Halfmoon Bay, Vedder Crossing. Some specimens from the Princeton area show intergradation with the following race.

Lynx rufus pallescens Merriam

Merriam, North Amer. Fauna *16*:104, 1900. Type locality, Mount Adams, Skamania County, Washington.

Distinctions.—A larger, much paler grey coloured animal than the preceding subspecies, but with similar dark markings and bars.

Measurements.—Three males measured: Total length 34½ inches (30–37); tail 6 inches; hind foot 7 inches (6–8½). Two females measured: Total length 30 and 33 inches; tail 5¾ and 6½ inches; hind foot 6½ and 6¾ inches. Weight 32 pounds.

Distribution.—In the interior of the Province east of the Cascade Mountains to the Alberta boundary, south into the United States, north to Findlay Forks, and west across the Chilcotin plateau to the Coast Range. Specimen records from Williams Lake, Trinity Valley, Princeton, Ta Ta Lake (Fort Steele), Cranbrook, Creston.

Canada Lynx

Lynx canadensis canadensis Kerr

Kerr, Anim. King. *1*:157, 1792. Type locality, "eastern Canada."

Description.—A medium-sized cat, adults measuring up to 40 inches including a short tail of 4 inches; weight up to 33 pounds.

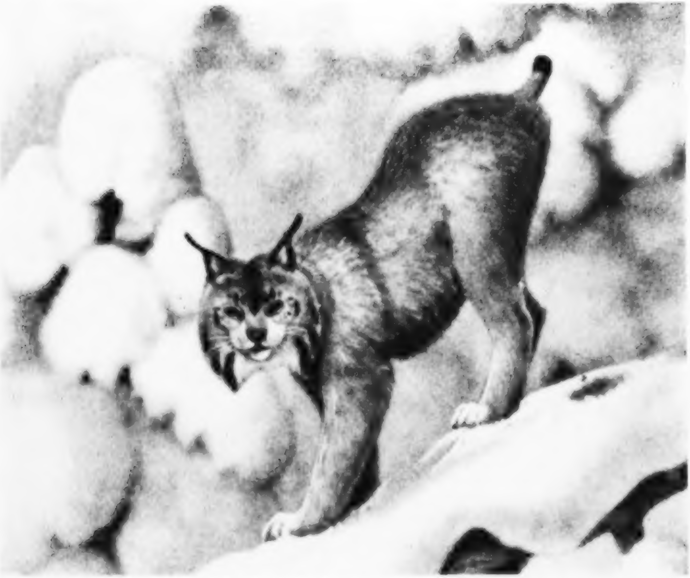


Plate 85. Canada Lynx, *Lynx canadensis.*

These are taller, longer-haired, paler-coloured animals than are the bobcats. Ear tufts are always prominently present, and the backs of the ears are grey, edged in black. The top of the head has indistinct black markings, and a diffused black mid-dorsal line runs from shoulder to tail. Long hairs on the side and the lower face sweep down and out to form characteristic facial discs. The legs are long, heavy, and are without black spots or bars. The feet are much larger in proportion than those of the bobcats, and the pads are light-coloured. The sides and underparts are without black spots and bars, but the tail-tip is black all around, although not preceded by black bars. The shape of the presphenoid bone is diagnostic (Fig. 25).

Measurements. — Three males measured: Total length 36 inches (34–36½); tail 4 inches (4–4¼); hind foot 9½ inches

(9¼–10½); weight 18 pounds. Four females measured: Total length 35½ inches (34¼–35½); tail 4½ inches (3⅘–5); hind foot 4 inches (8¾–9½); weight 18 pounds.

Habitat.—Mixed deciduous and coniferous forests, their edges, burns, and around natural forest clearings from valley-bottom to mountain-top are the preferred habitats of the Canada lynx. It is a creature of the forests, usually remaining in or near the cover.

Biology.—The food of this animal consists almost entirely of the varying hare, and population densities of lynx vary directly with the abundance of that prey species. Rodents, birds, and the young of large ungulates are also utilized. One to four young are born in May, after a gestation period of sixty days, usually in natural recesses—caves, windfall, or rock-slides.

Distribution. — Throughout the Province east of the Coast Range, with centre of abundance northwards; so far not recorded from the immediate coast. Specimens from 14 miles north of Fort Halkett, west side Smith River, Buckinghorse River 94 miles south of Fort Nelson, Atlin, Lower Iskut River, Tatchick Lake, Barkerville district, Sustut River, Quesnel, Cheslako River, Clisbako Lake, Chezacut, Anahim Lake, One Eye Lake, west branch of Homathko River, Williams Lake, Horsefly River, Lac la Hache, Cache Creek, Lumby, Falkland, Summerland, Nelson, Kootenay Crossing, Creston.

ORDER PINNIPEDIA—SEALS, SEA-LIONS, AND WALRUSES

FAMILY OTARIIDÆ—EARED SEALS

GENUS CALLORHINUS—NORTHERN FUR-SEALS

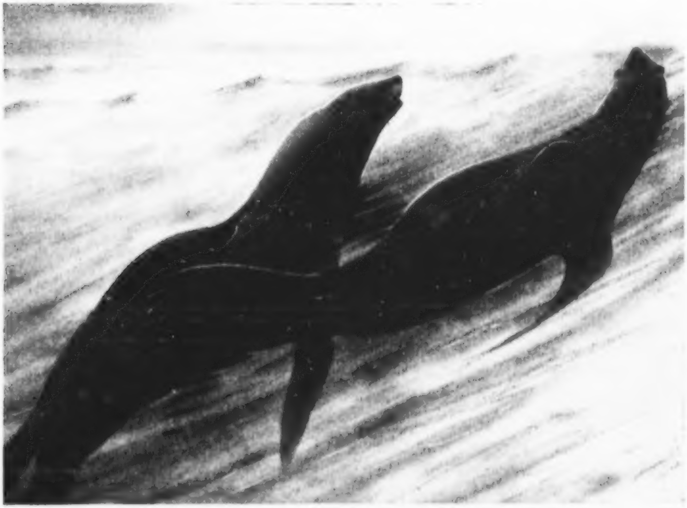


Plate 86. Northern Fur-seal, *Callorhinus ursinus.*

Northern Fur-seal

Callorhinus ursinus cynocephalus (Walbaum)

Walbaum, in Artedi, Genera Pisc., p. 560, 1792. Type locality, north Pacific at approximately latitude 53° N., longitude 155° W.

Description.—An eared seal, adult males measuring 7 feet, females 5 feet in total length including the short tail of 2 inches. Males weigh up to 600 pounds, females 120 pounds. Limbs are modified into paddle-like flippers, with those behind capable of forward rotation. On land the seal moves with its body lifted off the ground. The head is small, muzzle short, eyes large and the external ear a finger-like process visible at close range. At rest on the sea these animals often lie with one hind flipper waving above the surface. The pelage is dark brown on adult males, silvery grey on females and young males; pups are shiny black at birth. A light patch on the chest shows when fur-seals rear out of the water. Even decomposed or partial specimens may be readily identified by the dense coat of velvety underfur which makes this animal so valuable commercially. The smaller size and dense velvety underfur usually suffice in separating this animal from the Stellar sea-lion. The relatively long hind flippers with all five toes nearly equal serve in separating it from the California sea-lion.

Measurements.—No measurements of adult animals are available from British Columbia, but Scheffer and Wilke (1953) give measurements of adult animals (10 years of age or older) as follows: Seven males—total length 78½ inches (74½–84½), weight 427 pounds (330–601); fifty-two females—total length 51 inches (46–56), weight 94 pounds (84–120).

Habitat.—Females and young leave the Pribilof Islands rookeries in October, migrating southwards through pelagic waters as far as the coast of California and Japan. Adult males remain in northern waters in the Bering Sea and Gulf of Alaska. From June through October the largest part of the population is on the breeding-grounds of the Pribilof Islands on the American side and on Bering and Robbin Islands on the Russian side of the Bering Sea.

Biology.—Food varies seasonally, but in specimens captured near Vancouver Island it consisted largely of herring, eulachon, pilchards, and salmon (Clements, Hart, and Wilby, 1936). Kenyon and Scheffer (1953) record traces of salmon in only 1.5 per cent of nearly 5,000 fur-seal stomachs examined. A few bull fur-seals arrive on the rookeries early in May, but most of them come ashore during early June and struggle for favourable positions, which they often maintain only by savage fighting. The females arrive toward mid-June and gather with the males in harems of from 10 to 100 females each. Mating takes place from five to seven days after the pup is born, and until that time the cow is compelled by the male to remain ashore. After a three-month period, the mother puts out to sea for the winter migration and the pup is left to fend for itself.

Distribution.—In British Columbia these animals occur in pelagic waters off the west coast of Vancouver Island, the Queen Charlotte Islands, and in the waters of Hecate Strait and Queen Charlotte Sound during migratory periods. Occasionally individual fur-seals are encountered in littoral waters, as in Georgia Strait. Specimens examined from the east coast of Vancouver Island and from the mouth of the Fraser were young animals in poor condition. Specimen records from Langara Island, Goose Island, Bamfield, Tofino, Becher Bay, Fraser River (mouth), Courtenay, Campbell River.

GENUS EUMETOPIAS—NORTHERN SEA-LIONS

Northern Sea-lion

Eumetopias jubata (Schreber)

Schreber, Die Saugthiere, *3*:300, 1776. Type locality, north Pacific Ocean.

Description.—The largest of the eared seals, adult males measuring up to 11 feet (largest at Provincial Museum 10 feet 6 inches) and weighing up to 2,200 pounds. Females are smaller, weighing up to 1,000 pounds (weights, Kenyon and Scheffer). Limbs modified into paddle-shaped flippers which are directed posteriorly when animal is afloat. Hind flippers extend beyond the tail and are capable of forward rotation. Stance on land much like that of the California sea-lion. The body is cylindrical, stream-lined; males massive in the forequarters. Head relatively small, eyes large, whiskers prominent. Ear pinna external, small and inconspicuous. Pelage is short and coarse with no underfur; males pale buffy colour, sometimes appearing almost white when dry; females are somewhat darker, while young animals are dark brown for the first few months after birth. The larger size, pale coloration, lack of crest on head of adult males, and voice serve to distinguish this species from the California sea-lion. From the fur-seal, the much lighter colour and much greater size are sufficient to separate the two.

Measurements.—No external measurements are available.

Habitat.—During summer months on and around certain rocky islets along the entire Pacific coast of North America from California northwards. In winter months often seen in littoral waters from the south end of Vancouver Island northwards. During periods of eulachon, herring, and salmon runs, sea-lions tend to concentrate in the river estuaries and often forage a short distance up some of the larger systems.

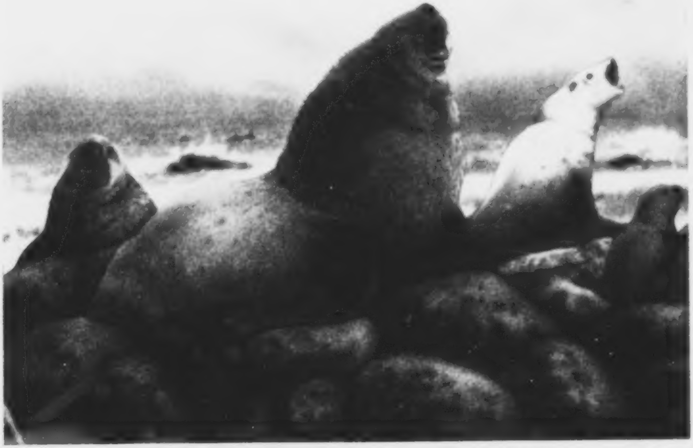


Plate 87. Northern Sea-lion, *Eumetopias jubata.*

Biology.—Food consists largely of lamprey, squid, sand lance, pollack, flounders, sculpin, cod, herring, small sharks, skates, perch, and various other scrap fishes, with small amounts of salmon, halibut, and sablefish. In British Columbia eulachon are apparently taken when those fishes are entering the rivers. The northern sea-lion breeds throughout its range during June and July. Mature males each gather harems of ten to twenty females on certain rocky islets; each female bears one pup, which is suckled for at least three months. Young can swim weakly at birth, but as a rule do not take to the water for several weeks after they are born.

Range.—Islands of southern California northward to the Bering Sea, with a centre of abundance in the northern areas. In British Columbia these animals frequent isolated offshore islets, notably the Scott Islands, Price Island, and Cape St. James, where there are large rookeries harbouring several thousands of sea-lions during the summer months. In the winter the animals are often seen in bays, river estuaries, and channels all along the British Columbia coast. Specimen records from Cox Island (Q.C.I.), Cape Scott, Quatsino Sound, Sointula, Alert Bay, Pender Island, Ucluelet, Nanaimo, Victoria.

GENUS ZALOPHUS—CALIFORNIA SEA-LIONS

California Sea-lion

Zalophus californianus (Lesson)

Lesson, Dict. Class. Hist. Nat., *13*:420, 1828. Type locality, California.

Description.—A large eared seal, males measuring up to 8 feet in length including a very short inconspicuous tail. Weight up to 1,000 pounds. Females are smaller and more fusiform in shape, measuring about 6 feet and weighing up to 200 pounds. Limbs are modified into paddle-shaped flippers, which are directed posteriorly when the animal is afloat. Hind flippers extend beyond the tail and are capable of forward rotation. When moving on land, the body can be supported by the limbs; the animal reclines upon its belly, fore-flippers braced more or less at right angles, head and chest off the ground. The body is cylindrical, stream-lined, and heavier in the forequarters. Head is relatively small, eyes large, whiskers prominent. Ear pinna external, small and inconspicuous. Adult males have a characteristic crest on the forehead. Pelage is short and coarse with no dense underfur; it ranges from reddish-brown to light buff when dry, almost black when wet. This sea-lion is likely to be confused only with the northern sea-lion and the northern fur-seal. From the former distinguished by smaller size, distinct crest on adult males, and by voice differences. The Steller sea-lion utters a " deep-throated bellow," the California sea-lion a " honking bark."

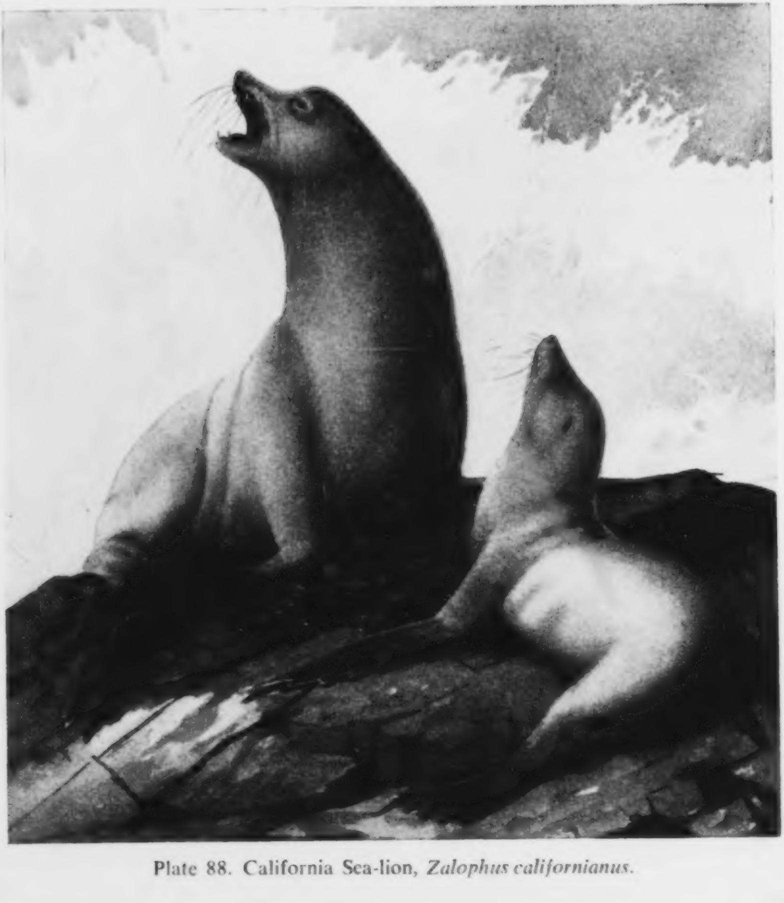


Plate 88. California Sea-lion, *Zalophus californianus*.

In distinguishing this animal from the northern fur-seal, diagnostic features are a broader heavier muzzle, stubby hind flippers with two outer toes distinctly larger than the inner three, and the lack of dense fine underfur.

Measurements.—No measurements available.

Habitat.—Littoral waters, shores, and rocky islets of the Pacific Ocean.

Biology.—Food consists largely of squid, octopus, and various fish, such as herring, rockfish, hake, and ratfish. Breeds on small offshore islets from Santa Barbara southward into Mexico in late May and June. So far as is known, the harem structure is similar to that of the northern sea-lion. As in all pinnipeds, there is normally a single young.

Range.—Coast of California and Mexico, where it breeds on small offshore islands. During the winter the range extends northward, and although only two official specimen records exists for British Columbia, west coast fishermen inform us that California sea-lions occur almost every winter in the Barkley Sound area on southern Vancouver Island. Specimen records are from Ucluelet.

FAMILY PHOCIDÆ—"EARLESS" SEALS

GENUS PHOCA—HAIR SEALS

Hair Seal

Phoca vitulina richardi (Gray)

Gray, Proc. Zool. Soc., *1*:28, 1864. Type locality, Vancouver Island, British Columbia.

Description.—The hair seal, sometimes known as harbour seal, is a stubby fusiform-shaped mammal with limbs modified in the form of flippers. The head is round and smooth; that is, without external ear pinna. Large eyes are situated high on the head and the nostrils relatively high in the snout, enabling the animal to see and breathe while exposing a minimum amount of the body. The flippers are highly specialized, covered with hair, and with claws terminal. The hind flippers are not capable of forward rotation. Pelage is coarse and varies in colour from almost white to very dark grey, usually heavily marbled and blotched with dusky olive or black. Pups are silver grey coloured with black markings. The prominent whiskers are flattened, and with bead-like expansions that give the appearance of spiral twisting not found in the fur-seal and sea-lions. The hair seal may be further distinguished from the sea-lion and elephant seal by its smaller size, adults measuring from 48 inches to 67 inches in total length and weighing up to 300 pounds. From the fur-seal it is distinguished by colour, pelage, lack of ear pinna, and by having all flippers short and fur-covered.

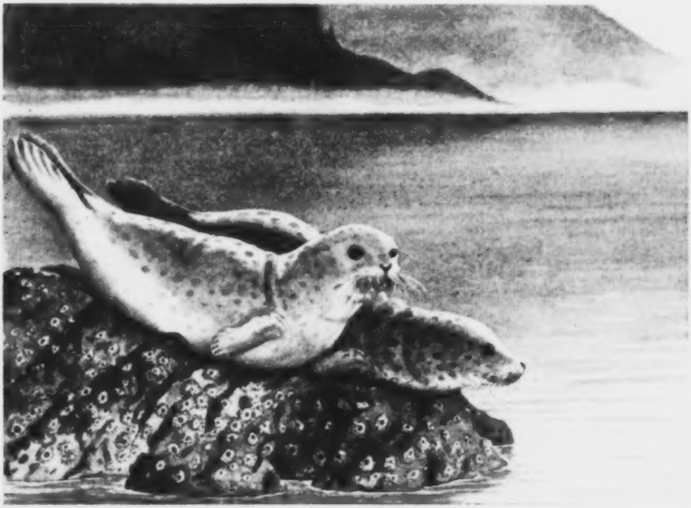


Plate 89. Hair Seal, *Phoca vitulina.*

Hair seals swim with the hind flippers, the sea-lions by means of the front flippers, consequently the mode of travel and of diving differs greatly. Hair seals move quietly through the water and sink quietly to swim beneath the surface when speed is essential. Sea-lions and fur-seals broach and plunge ahead in the dive and are often seen travelling along in a continuous series of broaches and dives. The hair seal frequents waters close to shore as a rule and is seen in shallow bays and inlets to a far greater extent than are the others. It hauls out regularly on sand-bars and reefs, worming its way awkwardly to a point from where it may flop quickly into the sea.

Measurements.—Average measurements of five adults were: Total length 59½ inches; tail 3½ inches; hind flipper 11 inches; weight 185 pounds with very large males exceeding 300 pounds.

Habitat.—Littoral waters and shore along the entire British Columbia coast-line. The hair seal also ascends almost all the larger rivers and may even become resident in certain lakes many miles from the sea (e.g., Harrison Lake, Lakelse Lake).

Biology.—Food of the hair seal is made up entirely of fish and shell-fish. Fisher (1952) lists rockfish, salmon, herring, lamprey, octopus, and crustaceans as the food items found in twenty stomachs from the British Columbia coast. Only five stomachs contained salmon. The hair seal apparently mates in midsummer and has a delayed implantation (Fisher, 1954). Usually a single pup is born in late May or June after a gestation period of nine months (Fisher, 1952). Isolated reefs and sand-bars in the sea or in a large river are utilized as pupping-grounds. There is no organized harem formation with hair seals, although several females may seek out the same sand-bar on which to give birth to their young. The pup is able to swim at birth, but is carefully tended by the mother, who seizes and hauls it under at the approach of danger. When killer whales, the seals' greatest enemy, approach, seals haul out or seek very shallow water to escape.

Distribution.—Hair seals occur along the entire British Columbia coast and coastal islands. Specimen records from selected localities: Naden Harbour, Bay Harbour, Skeena River, Ecstall River, Prince Rupert, Price Island, Bella Coola, Goose Island, Gibson Island, Vancouver, Nanaimo, Victoria, Becher Bay, Sooke.

GENUS MIROUNGA—ELEPHANT SEALS

Northern Elephant Seal

Mirounga angustirostris (Gill)

Gill, Proc. Chicago Acad. Sci. *1*:33, 1866. Type locality, St. Bartholomew's Bay, Lower California, Mexico.

Description.—A very large seal, adult males measuring up to 16 feet in total length and weighing about 2½ tons. The male has a long inflatable snout, and in old specimens the skin about the chest and shoulders is deeply cracked and wrinkled. The females are smaller and without the inflatable snout. These animals are dirty greyish-brown in colour and are sparsely haired with short body hairs. The elephant seal is one of the so-called " earless " seals, more closely related to the hair seal than to the sea-lions. Ear pinnæ are lacking and the hind flippers are incapable of forward rotation.

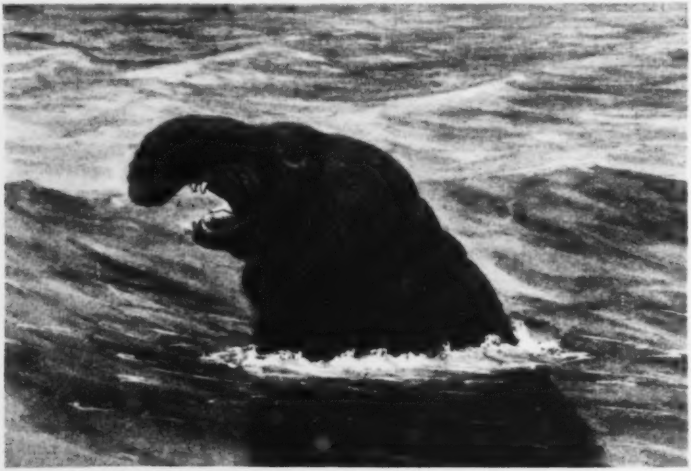


Plate 90. Northern Elephant Seal, *Mirounga angustirostris.*

Like the hair seals, these animals sink slowly below the surface when submerging and swim by use of the hind flippers rather than the front. As this is the largest seal occurring on the British Columbia coast, it is easily recognized, and in the case of males the pendulous snout facilitates identification as well. Elephant seals are comparatively rare at these latitudes, and to date only two specimens have been taken on the British Columbia coast. Individuals have been seen on numerous occasions by reliable and observant persons, and the species may occur in British Columbia waters more frequently than has hitherto been suspected.

Measurements.—An adult male taken at Ucluelet measured: Total length 13½ feet; tail 11 inches; hind foot 2½ feet; weight approximately 2,500 pounds. This animal had been driven ashore by killer whales at the mouth of Ucluelet Harbour, where it was subsequently dispatched by a native and salvaged by the Provincial Museum.

Biology.—Little is known concerning the habits of the elephant seal at these latitudes. Kenyon and Scheffer (1953) state: "The elephant seal is polygamous but its harem structure is loose compared to that of the sea-lions and fur-seals. Elephant seals breed only on several small islands off the Mexico and California coasts, principally San Benito and Guadalupe; newly born young are black in colour." Kenyon and Scheffer (op. cit.) record a number of small sharks, squids, and rays taken from the stomach of an elephant seal killed 40 miles off shore, presumably off California. The stomach of the specimen taken at Ucluelet contained only a cluster of hagfish eggs and the partially digested vertebral column of a fish, probably hagfish.

Habitat.—Pelagic and littoral waters of the Pacific Ocean, principally off the coasts of California and Mexico, but northward in the winter as far as southern Alaska.

Range.—Elephant seals were numerous at one time off the southern California and Mexican coast-lines, where, by 1890, they were almost exterminated for their blubber. Under complete protection, the herd now has increased to about 1,000 individuals Kenyon and Scheffer (op. cit.). Although the centre of abundance is to the south, these animals are reported regularly from British Columbia waters and occasionally from Alaska. Specimen records from British Columbia were taken at Pine Island and Ucluelet.

KEY TO THE SPECIES OF CLOVEN-HOOFED UNGULATES (ORDER ARTIODACTYLA)

1. Horns (not antlers) present in both sexes.

2. Colour white, horns black. Mountain goat. *Oreamnos americanus.*

2′. Colour brown or white; if white, horns pale yellowish-brown.

3. Size very large, massive, shoulders above level of head, colour brown, tail long, horns short, curved sideways and forward, black. Buffalo or bison. *Bison americanus.*

3′. Size moderate, head held above shoulder height, very short tail, horns of males spirally curved upwards, backwards, downwards, and forward.

4. Horns pale yellowish-brown, conspicuous ridge on outer forward angle. Thinhorn sheep. *Ovis dalli.*

4′. Horns brown, no conspicuous ridge on outer angle. Bighorn sheep. *Ovis canadensis.*

1′. Males with bony antlers, females antlered or antlerless.

5. Antlers entirely or partially palmate.

6. Antlers broadly palmate and extending sideways; size very large; head, neck, and body dark brown to blackish. Moose. *Alces alces.*

6′. Antlers partially palmate, extending upwards from head, size large or moderate.

7. Confined to James Island or Vancouver Island. Fallow deer. *Dama dama.*

7′. Not found on James or Vancouver Islands.

8. Range confined to Queen Charlotte Islands. Dawson caribou. *Rangifer dawsoni.*

8′. Range on mainland. Arctic or mountain caribou. *Rangifer arcticus.*

5′. Antlers not palmate.

9. Conspicuous pale area on rump, tail short and with no black on it. No metatarsal glands.

10. Weight under 300 pounds, colour dark reddish-brown. European red deer. *Cervus elaphus.*

10′. Weight over 300 pounds, colour yellowish or reddish brown. Elk. *Cervus canadensis.*

9′. If conspicuous pale area on rump, tail longer and with some black on it; metatarsal glands present on outside of lower part of hind legs.

11. Metatarsal glands 1½ inches or less in length, tail about 12 inches long, waved when animal in flight. Whitetail deer. *Odocoileus virginianus.*

11′. Metatarsal glands 2½ inches or more in length, tail about 7 inches long, not waved when animal in flight, tail with black tip or entire outer surface black. Blacktailed deer. *Odocoileus hemionus.*

ORDER ARTIODACTYLA—CLOVEN-HOOFED UNGULATES
FAMILY CERVIDÆ—DEER
GENUS CERVUS—TRUE DEER OR TINE-ANTLERED DEER

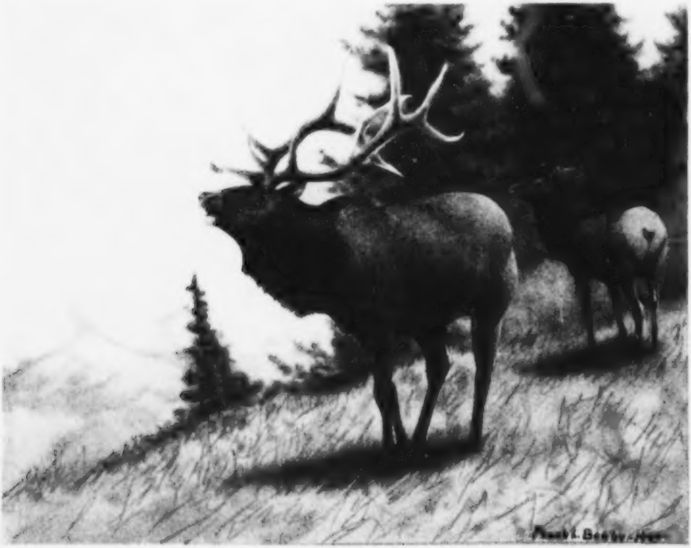


Plate 91. Elk or Wapiti, *Cervus canadensis*.

Elk or Wapiti

Cervus canadensis (Erxleben)

Description.—General body colour of the wapiti varies from yellowish-grey to tawny or even darker yellowish or reddish brown. In both sexes head and neck are darker than body. In males these parts may be fuscous or rich dark brown. The rump bears a heart-shaped patch of pale straw colour surrounding the tail and extending down on to the upper thighs; legs chestnut or darker. There are quite definite sex differences in colour, the males being paler with more strongly contrasting neck. Sex differences greatest in the bleached pelage in spring. At this time males can be determined at great distance by their creamy colour. Hair on neck long and shaggy, hanging from throat in a short mane.

A tuft of long stiff hairs on the inside of each heel over the tarsal gland; there are also scent glands between the digits on each hoof. Tail short and glandular. Both sexes possess canine or "elk" teeth, those of the 2-year-old bull being the largest.

Antlers.—The female bears no antlers. The antlers of the mature male are tall and spreading. Each bears from six to, exceptionally, eight tines. These are respectively the brow, bez, trez, royal, and two or more surroyals.

The first set of antlers, grown by males 18 months old, are long spikes, as much as 18 inches in height. The second set usually bears about four or five tines on antlers of 24 inches in height. The 3-year-old grows larger five-point antlers, and from then on six-point antlers may be developed. The largest antlers are produced by males of 6 to 10 years. Mature bulls shed the antlers from March to April, some 2- and 3-year-olds in April and May, while spike bulls usually carry them well into May and even until early June.

Measurements and Weights.—Adult males may weigh as much as 800 pounds; females have a maximum weight of about 490 pounds. Two calves at birth weighed 40 and 42 pounds.

Biology.—The wapiti is a highly adaptable species. Its preference is for parkland country, where clumps of conifers provide shelter and where groves of deciduous trees interspersed with grassland provide food. The diet is normally about 80 per cent grass and herbs, but it can survive on an almost 80-per-cent browse diet. Food consists of a large variety of grasses, herbs, shrubs, and deciduous trees. It migrates seasonally from low-elevation winter ranges to mountain summer range at elevations as high as grazing is available. In general though it stays close to timber-line in the summer. The males and dry cows are more migratory than the cows with calf.

Mating takes place in September, the bulls bugling frequently day and night. They are polygamous, a bull securing a group of from four to twenty cows; gestation is about 255 days. Where living conditions are good, twin calves occur in about 25 per cent of births, but on poor ranges single births are invariable and sterility may be high. Females have their first calf when they are 3 years or more old and annually thereafter. Even in populations that are not hunted the adult population is about 30 per cent bulls and 70 per cent cows. Sex ratio to 1 year is about 50–50, but thereafter the males have a higher death rate.

The chief predators are wolves, mountain lions, and, in some areas, grizzly bears; main known natural causes of death in British Columbia are winter starvation, winter tick attack, and lung-worm infestation in that order; elk are also host to many internal parasites.

SUBSPECIES

Rocky Mountain Elk

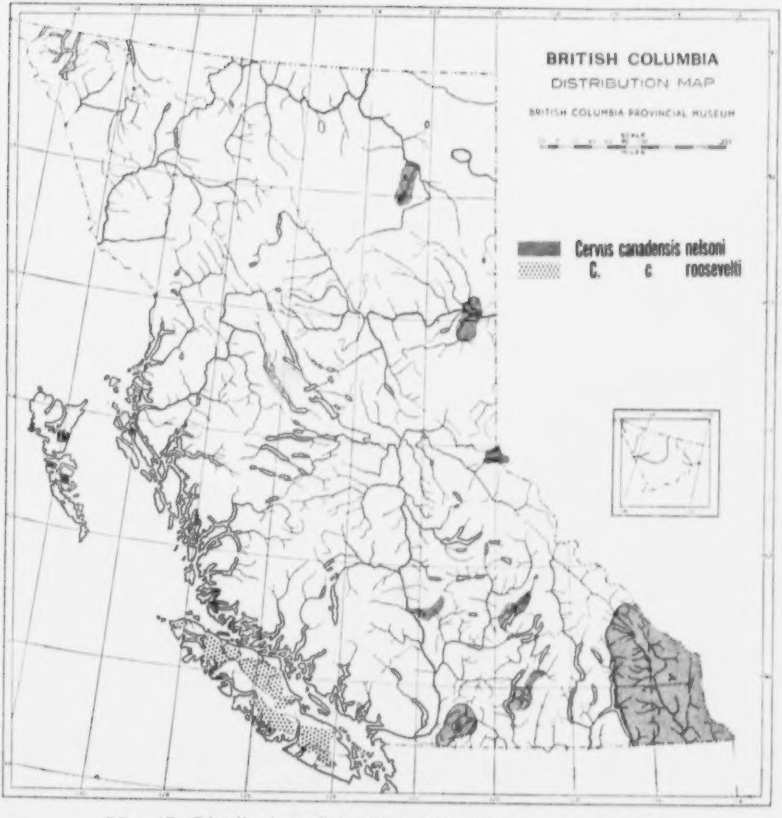
Cervus canadensis nelsoni Bailey

Bailey, Proc. Biol. Soc. Wash. *48*:187, 1935. Type locality, Yellowstone National Park, Wyoming.

Distinctions.—Paler in colour than *roosevelti* and with skull characteristics and antler peculiarities as described under the next race.

Measurements. — One adult bull measured: Total length 91 inches; tail 4 inches; hind foot 27 inches; ear from notch 8¾ inches; height at shoulder 51 inches. Four old cows measured: Total length 90 inches (88–97); tail 6 inches (5–7); hind foot 25 inches (24½–25¾); ear from notch 8¼ inches (8–8½); height at shoulder 53 inches (50–56).

Distribution.—This subspecies occurs along the western side of the Rockies from the International Boundary north to the Kicking Horse River valley. Another herd exists in Yellowhead Pass and west as far as Yellowhead Lake. Still another herd has established itself in the vicinity of St. Mary Lake, and individuals and small groups range the area westward to Creston. Introduced herds are established near Princeton, on the west face of the Kettle Mountains between Penticton and Kelowna, at Adams Lake, at McNab Creek on Howe Sound, and on Graham Island (Q.C.I.). The northernmost natural herds are along the Muskwa River below Tuchodi


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Cervus canadensis nelsoni
C. c roosevelti

Map 47. Distribution of the Elk or Wapiti, *Cervus canadensis.*

Lakes, one specimen from Tupper Creek (old remains), and a recent record from near Fort St. John. An introduction at Yalakom River failed and may have been the source of single animals seen here and there in the Chilcotin and as far north as Meldrum Creek.

Recent remains, referable to the early part of the nineteenth century, are numerous throughout the Cariboo District, from Kamloops to Williams Lake.

Specimens examined from Tuchodi Lake, Yoho Park, Bull River, Fording River. Specimens of introduced stock from Skidegate (Q.C.I.) and McNab Creek.

Roosevelt Elk

Cervus canadensis roosevelti Merriam

Merriam, Proc. Biol. Soc. Wash. *4*:272. Type locality, Mount Elaine, Olympic Peninsula, Clallam County, Washington.

Description.—Differs from *nelsoni* in darker colour and in having a marked tendency for mature males to develop a cup at the level of the royal tine (Fig. 26).

Measurements.—A 3-year-old bull from Green River, Vancouver Island, measured: Total length 88¼ inches; tail 5¼ inches; hind foot 26 inches; weight 590 pounds. Three adult females from the same area measured: Total length 81 inches (71–91); tail 5 inches (4½–5½); hind foot 25 inches (24–26); weight 447 pounds (419–488).

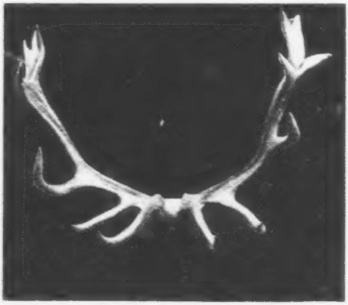


Fig. 26. Antlers of Roosevelt elk from Duncan, Vancouver Island, to show "cup" at tips.

Habitat.—This race is an inhabitant of the west coast rain forests. Here it formerly occupied the deciduous forest areas of the Fraser River delta and of the eastern coast of Vancouver Island. It was exterminated on the mainland by natural causes at least 100 years ago, but on Vancouver Island exists as relict herds living in river-valleys during the winter and at higher elevations in the summer months. In some areas the herds remain in the forest at low elevations throughout the year.

Distribution. — In British Columbia restricted to Vancouver Island and occasionally on some of the larger islands adjacent to it. Small bands are known to exist in ancestral locations from Jordan River north to Cape Scott. Records known from Cape Scott, Nimpkish Lake, Cracroft Island, Upper Campbell Lake, Quinsam River, Buttle Lake, Black Creek, Oyster River, Comox, Northwest Bay, Mount Benson, Nanaimo Lakes, Green River, Shaw Creek, Quatsino, Salmon River, White River, Alberni Canal, Jordan River, Saanich Peninsula (relic), Saltspring Island, Saturna Island (pick up antlers).

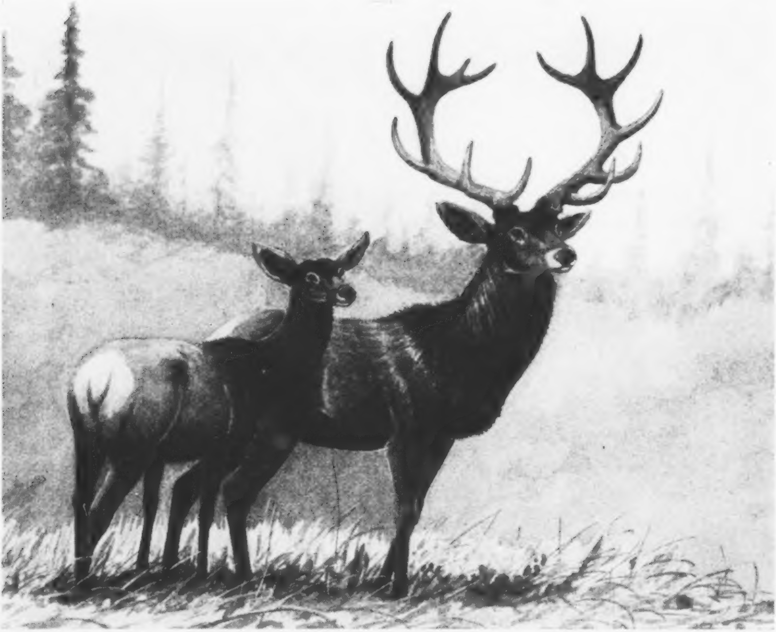


Plate 92. Red Deer or European Stag, *Cervus elaphus*.

Red Deer or European Stag

Cervus elaphus Linnæus

Linnæus, Systema Naturæ, *1*, 10th ed., p. 66, 1758. Type locality, Sweden.

Description.—Resembles the wapiti in body form and antlers but is smaller and darker in colour. Colour dull reddish-brown in summer, greyish-brown in winter, a paler patch on the rump; underparts paler than back.

Measurements.—None available from British Columbia.

Distribution.—A small group of red deer obtained from New Zealand was liberated near Masset, Q.C.I. They survived and increased but did not spread far. Wanton killing between 1942 and 1947 appears to have exterminated the species.

GENUS DAMA—FALLOW DEER

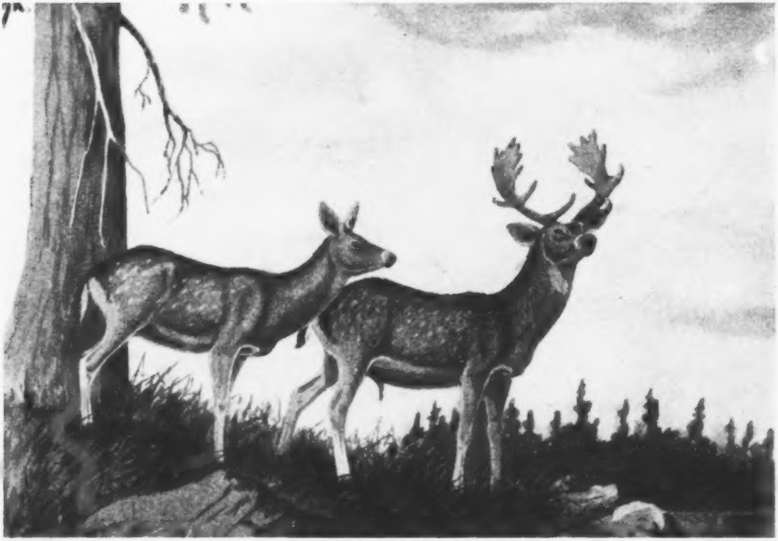


Plate 93. Fallow Deer, *Dama dama.*

Fallow Deer

Dama dama Linnæus

Linnæus, Systema Naturæ, 10th ed., p. 67, 1755. Type locality, Sweden.

Description.—About the size of the mule deer. Colour variable, typically in summer reddish-brown with numerous white spots, in winter uniform greyish-brown. Black or white individuals are common, and the former may outnumber the typical colour pattern. Underparts white; tail long, brown above basally, black at tip, terminal hairs often prolonged. No metatarsal gland.

Antlers.—The antlers have a large brow tine and the tops palmate or flattened laterally; no antlers on the females.

Measurements.—Adult male: Length about 62 inches; tail 7¾ inches; hind foot 17½ inches.

Biology.—Nothing is known of the life-history of the introduced population in British Columbia.

Distribution.—Introduced and abundant on James Island; transplanted from there to Sidney Island and Vancouver Island, where it was unsuccessful. Individuals seen occasionally on the Saanich Peninsula are believed to cross over from James Island.

GENUS ODOCOILEUS—AMERICAN DEER

Description.—Medium-sized deer with antlers in males only. Antlers of mature males not palmate; tines arise from the back or upper surface of antler except for brow tine. Both sexes have three types of scent glands—interdigital between toes on each foot, metatarsal on the outside of shank, and tarsal on inner surface of heel

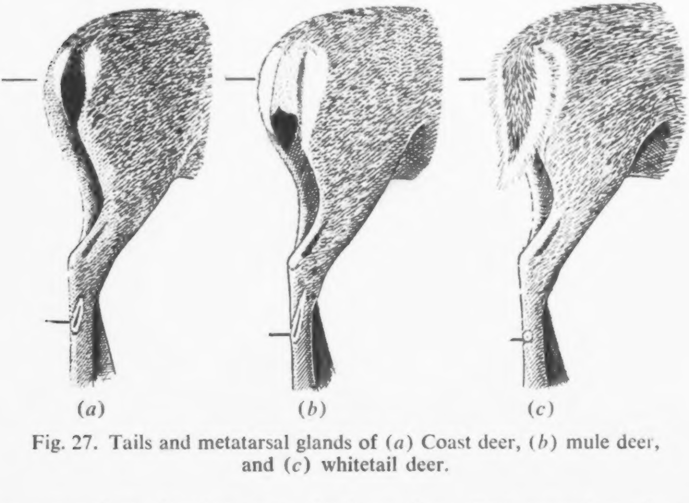

(*a*) (*b*) (*c*)

Fig. 27. Tails and metatarsal glands of (*a*) Coast deer, (*b*) mule deer, and (*c*) whitetail deer.

or hock joint. A preorbital pit in front of eye is of unknown function. Usually no canine teeth in upper jaw.

There are two annual moults, giving rise to a reddish-brown summer pelage and brown or grey winter pelage. The fawns are spotted with white.

Blacktail Deer

Odocoileus hemionus (Rafinesque)

Description.—Detailed descriptions are given under the subspecies, but all forms of blacktail deer can be distinguished from the whitetail deer by the following characteristics: The blacktail has antlers that typically branch into two and then each branch into two again (dichotomous, *see* Fig. 28 (*b*)); the metatarsal glands on the outer side of the lower leg are surrounded by brown hair and are 2½ inches or more in length on adult animals; the tail not more than 8 inches in length and either white with a black tip or dark brown with terminal third or more black. There are also many distinctive features of skull and teeth.

Summer pelage reddish-buff, winter pelage from reddish-brown to steel grey with brownish cast.

The three subspecies are sufficiently distinctive to be known by common names, but the above group name is desirable to refer to this species as distinct from the whitetail as a species.

SUBSPECIES

Coast Deer or Columbian Blacktail

Odocoileus hemionus columbianus (Richardson)

Richardson, Fauna Boreali-Americana *1*:257, 1829. Type locality, Cape Disappointment, Pacific County, Washington.

Distinctions.—Colour in winter reddish-brown to greyish-brown heavily sprinkled with black; underside of chest brown; belly, inside of hind legs and forelegs, and patch on throat and underside of neck white. Tail with upper surface brown basally, black for terminal half or two-thirds (*see* Fig. 27 (*a*)). No white rump patch. Metatarsal gland 2 to 3 inches long. In summer general body reddish-buff without black intermixture. Fawns, buff to chestnut spotted with white. Tail paler than in adult but diagnostic.

Measurements.—Vary with the nutritional quality of the habitat. Semi-dwarf races occur on some of the coastal islands; on Vancouver Island deer are largest on the logged-over land of the southern fourth and smallest in the north and west. The largest specimens come from the mainland areas adjacent to the Fraser Valley and Howe Sound. Weights of adult males including viscera may vary from 110 to 250 pounds; females 70 to 140 pounds, fawns at birth 3 to 6 pounds; deduct approximately one-fifth for dressed weight.

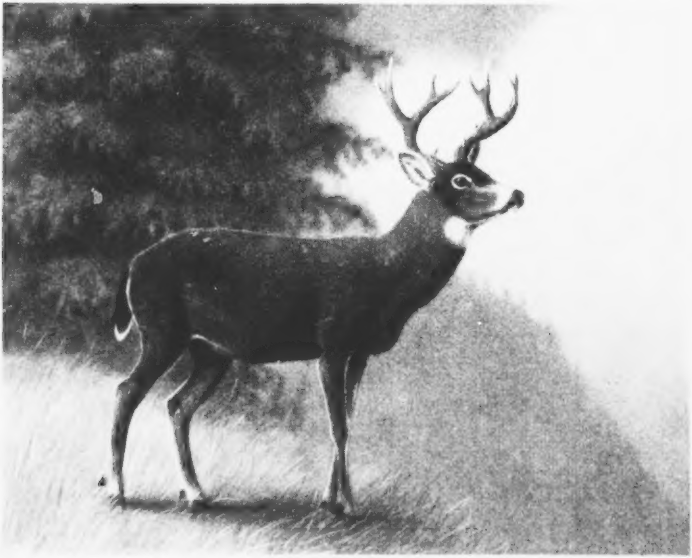


Plate 94. Coast Deer or Columbian Blacktail Deer, *Odocoileus hemionus columbianus.*

Adult males vary in size as follows: Total length 56 to 66 inches; tail 6 to 8 inches; hind foot 16 to 17 inches; height at shoulders 27 to 36 inches. Adult does: Total length 52 to 60 inches; tail 6 to 7½ inches; hind foot 16 to 17 inches.

Antlers.—Dichotomous type (Fig. 28 (*b*)). The perfect antler of a mature male has an eye-guard and four points on each side for a total of ten points for the "head." It differs from a mule deer antler in smaller size, relatively shorter distance from the base to the main fork, and narrower angle of forking. The colour of the antler depends in part on the kind of trees or shrubs used for "polishing" after the velvet is shed. Where the use of such material is denied, the antlers are pale brown when mature.

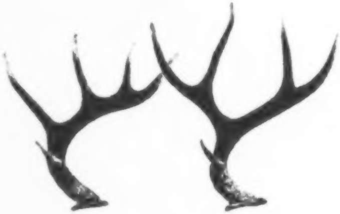

(*a*) (*b*)

Fig. 28. Antlers of (*a*) whitetail deer and (*b*) blacktail deer.

The buck fawn has buttons that seldom break the skin. At 18 months, spike antlers are grown; at 30 months, forked antlers; at 42 months, antlers with three points on each side. At ages beyond this the antlers may be of any form, but typically, though rarely, five on each side; very seldom more. Diet and the health of the buck are all-important; well-fed captive bucks have had six points as yearlings, while in many areas of poor diet, deer seldom, if ever, grow antlers larger than forks (total of four points).

Does with buck-type antlers are hermaphrodites and are sterile. Does with antlers of irregular form and with persistent velvet probably have diseased ovaries but are not always sterile.

Bucks castrated after the eighth month develop permanent misshapen antlers that do not lose the velvet.

Antlers are shed in March, though young animals may carry them a month later. The velvet is stripped in August and early September.

Biology.—Coast deer are confined to the humid western slope of the Coast Range and to the islands off the coast. They are excellent swimmers and swim several miles from island to island. Their diet varies with the habitat, but the most palatable plants are

Douglas fir, western cedar, Oregon yew, trailing blackberry, red huckleberry, and salal, supplemented in summer by a great variety of herbaceous plants. Many populations migrate to the mountaintops and high valleys during the summer and back to the lower ranges in the winter. In general the shelter of coniferous trees is essential for large-scale wintering.

The males are polygamous, but usually associate with only one female at a time. Mating takes place mostly in the two middle weeks of November but begins as early as mid-October. Where winter food is good, twins are the rule and triplets not uncommon. The females usually bear their first fawn on their second birthday or thereabouts, but if feeding has been poor they may be a year older. Well-fed captive animals have matured at 8 months.

The chief causes of death, neglecting man, are winter starvation and parasitic disease. Among predators, domestic dogs, cougars, and wolves are important, probably in that order.

In the wild a life length of 20 years has been recorded, 12 to 14 years is a more usual old age, but few live as long as that.

Distribution. — From the International Boundary to Rivers Inlet; north of this intergradation with *sitkensis* is gradual. Points of eastern extension are Boston Bar, Upper Skagit Valley, Pemberton Meadows. At many points along the eastern edge of its range it interbreeds with the mule deer, and populations of mixed character occur.

The race occurs on Vancouver Island, all the islands in the Strait of Georgia, and most of the islands along the north coast. Known exceptions are Pine, Table, Goose, Triangle, and Estevan Islands. About 200 specimens examined covering the entire range.

Mule Deer

Odocoileus hemionus hemionus (Rafinesque)

Rafinesque, Amer. Monthly Mag. *1*:436, 1817. Type locality, Sioux River, North Dakota.

Distinctions.—Differs from the Coast deer in larger size. Winter pelage grey rather than brown, under chest blackish, ears much larger (8¾ instead of 7½ inches from notch), tail white with black tip and surrounded by a white rump patch (*see* Fig. 27 (*b*)).

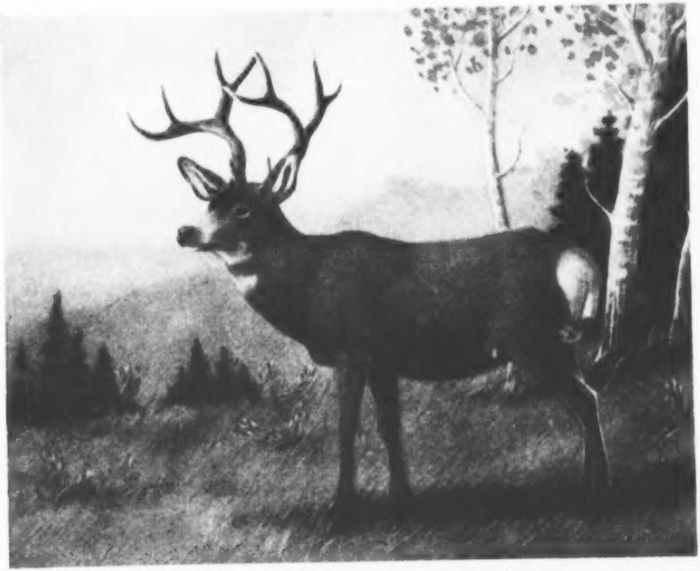
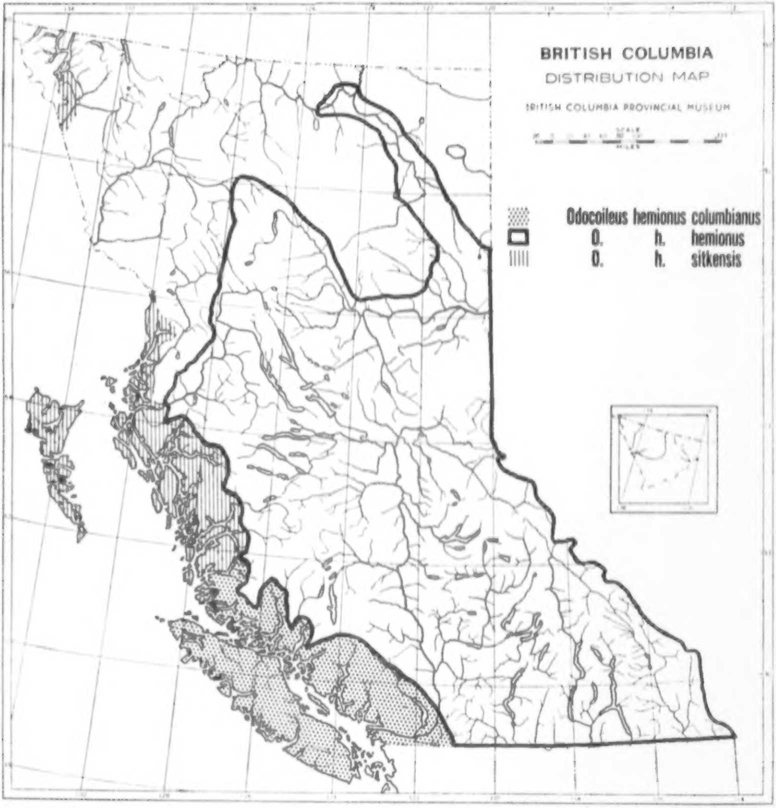


Plate 95. Mule Deer, *Odocoileus hemionus hemionus.*

Metatarsal gland 3½ to 5½ inches. There are many skull differences, for which *see* Cowan, 1936. Summer pelage paler buff than that of the Coast deer.

Measurements.—Three adult males measured: Total length 70 inches (68–74); tail 6 inches (5⅓–7); hind foot 23 inches (21–23). Weight with viscera in, 180 to 400 pounds, depending largely upon climatic and feeding conditions. Three females measured: Total length 57 inches (50–61); tail 7 inches (6½–7¾); hind foot 19 inches (18–20); weight 120 to 160 pounds.

Antlers.—Similar to those of the Coast deer but larger and with a greater vigour at all ages. Thus only on very poor range do the yearlings develop spike antlers; forks are the rule and sometimes three-point antlers for the first set. Usually large forks or three points are the second set, and most mature males have five-point antlers or larger (i.e., five points on each antler).


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Odocoileus hemionus columbianus
O. h. hemionus
O. h. sitkensis

Map 48. Distribution of the Blacktail Deer, *Odocoileus hemionus*.

Biology.—This deer is by preference a browser but eats more grass than does the Coast deer. Aspen, willow, red osier dogwood, serviceberry, bitterbrush, and mountain juniper are among the most favoured browse. Douglas fir is browsed when food is scarce. Many herbaceous plants are eaten, and the wheatgrasses, Junegrasses, and bluegrasses are sought after. Mating takes place from October to late November, with a concentration in early November. Males are polygamous and sometimes have two or three does with them at a time. More usually the male stays with one doe for two or three days and then goes in search of another. Fawns arrive in June after a gestation of 210 days. Sexual maturity occurs normally in the second autumn, and twin fawns are the rule except on poor range.

As with most of the deer family, winter starvation is the largest source of death; parasitic disease and predation follow. Main predators are the mountain lion and coyote. Wolves do not occupy much of the mule deer range, but prey on the deer where they do. Near farms and settlements domestic dogs are the most serious predator. Accidents on roads and railways during the time of deep snow also kill many deer.

Distribution.—The mule deer is fairly generally distributed across the Province from the Rockies to the summit of the Cascade and Coast Ranges, north as far as a line roughly from the head of the Atnarko Valley to Quesnel, Birch Island, Sicamous, Revelstoke, and Glacier, though it is scarce and local in the Selkirk Range north of Kootenay and Arrow Lakes. North of this line mule deer are more local but occur regularly to the Skeena and Upper Fraser. Local populations north of there are known in Driftwood Valley, at Hyland Post on the Finlay River, and in the Peace River area from Tupper Creek to Hudson Hope. There are hunter records from Buckinghorse River, Coal Creek, Steamboat Mountain, and Summit Pass in the Liard River Valley.

Sitka Deer

Odocoileus hemionus sitkensis Merriam

Merriam, Proc. Biol. Soc. Wash. *12*:100, 1898. Type locality, Sitka, Alaska.

Distinctions.—The differences between this subspecies and the Columbian blacktail are so slight as not to be apparent in the field. The colour in winter is more brownish, the tail tends to have basal half to two-thirds brown instead of only basal one-fourth to one-third. A critical difference in the cranial anatomy is in the breadth of the sublacrymal extension of the jugal bone. This is less than 5 mm. broad in *sitkensis.*

Antlers.—The antlers are proportionately shorter and thicker, with the distance to the main fork relatively shorter; antlers also tend to spread more quickly from skull. The antlers frequently bear close resemblance to those of the whitetail.

Measurements.—Those available indicate no significant difference from the Columbian blacktail.

Distribution.—The north coast and coastal islands from Fort Simpson to Calvert Island; there are hunter records for Atlin. Introduced from Porcher and Pitt Islands on to the Queen Charlotte Islands, where it is now found on all suitable islands. Specimens from Bella Bella, Calvert Island, Porcher Island, and many points on the Queen Charlotte Islands.

Whitetail Deer

Odocoileus virginianus ochrourus Bailey

Bailey, Proc. Biol. Soc. Wash. *45*:43, 1932. Type locality, Coolin, south end of Priest Lake, Idaho.

Description.—Colour in winter greyish-brown; underparts including chest, insides of hind legs, backs of lower forelegs, patch on throat, chin, and underside of tail white. Face greyer than body and paler in bucks than does. Tail very long and bushy, in alarm carried elevated and moving, thus exposing white underside (Fig. 27 (*c*)). No white rump patch. Metatarsal gland less than 1½ inches, often with marginal hairs white. Ears short and without black edge. There are many cranial characters (*see* Cowan, 1936). In summer, upper parts reddish-brown to ochraceous buff, distinctly "redder" than the mule deer. Fawn rufous with rows of white spots.

Measurements.—Mature males have a live weight of from 150 to 300 pounds, does 100 to 130 pounds. Total length of large

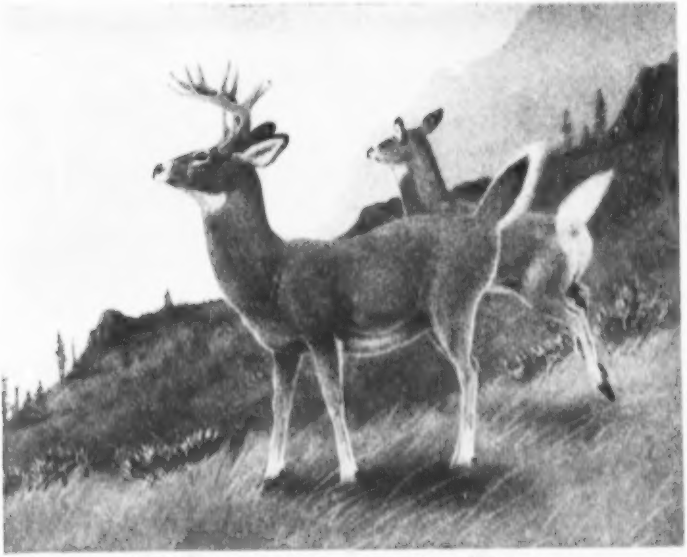
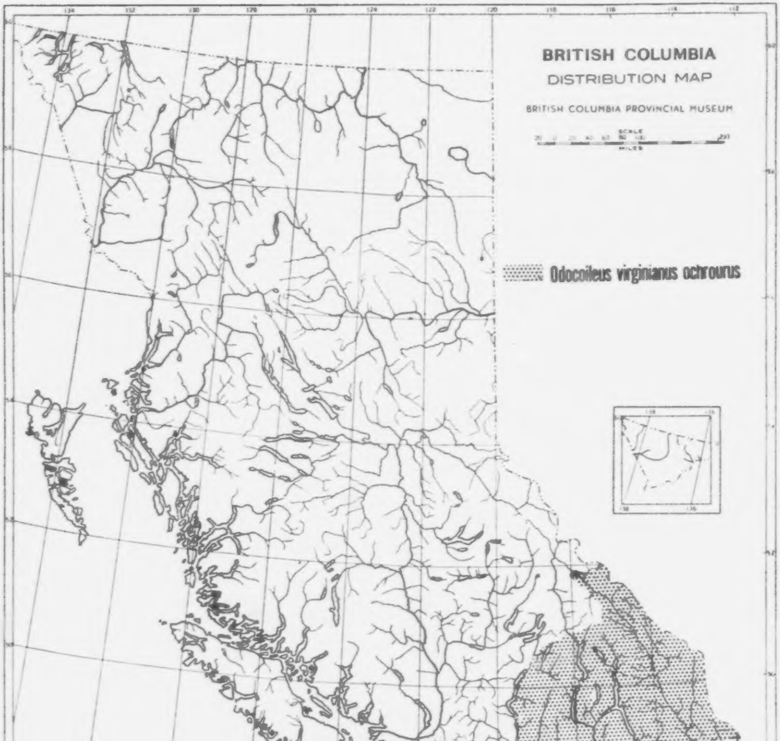


Plate 96. Whitetail Deer, *Odocoileus virginianus.*

males 70 to 76 inches; tail vertebræ 8 to 11 inches; hind foot 20 to 22 inches; height at shoulder 36 to 40 inches. Fawns are born at a weight of 4½ to 7 pounds.

Antlers.—Those of the mature male have one main beam that rises from the frontal bone almost parallel with its neighbour until the long pointed eye-guard is given off; it then sweeps back, outwards, finally forwards and inwards, giving off as it does so four or five points in an upwards direction (Fig. 28 (*a*)). The yearling buck grows either spike antlers or a set with one small branch on each. At 2½ years the antlers should have two branches each and a small eye-guard. At 3½ years and older there may be any number of points, depending on general vigour and nutritional state.

Biology.—In its range in the Province the whitetail is an inhabitant of the dense thickets of the lower valleys along the Kootenay and Columbia Rivers. They are found in all the forest


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
▨ Odocoileus virginianus ochrourus

Map 49. Distribution of the Whitetail Deer, *Odocoileus virginianus*.

types of the region except the Engelmann spruce type. In this they occur only as transients or along open watercourses and burned-over areas. A large part of the population migrates to the higher elevations, even to timber-line at 7,000 feet or more during the summer. Its diet is not known to differ materially from that of the mule deer in the same area.

Mating takes place in mid-November, one male remaining usually with one female until she is served and then seeking other mates. The gestation period is 210 days, and the fawns are born in early June. Twins are more frequent than singles if the feed and shelter conditions are good.

Maturity is reached in the second autumn. There are no records of mating in the first autumn in British Columbia, as happens frequently in some of the other races of this species.

Little is known of mortality factors concerning this species in the Province.

Distribution.—Inhabits the Kootenay-Columbia drainage systems north to Kinbasket Lake and Revelstoke west to Bridesville and Lumby; formerly to Oliver and Penticton. Locality records are Cranbrook, Elko, Nelson, Creston, Kootenay Crossing, Golden, Penticton, Oliver, Osoyoos Lake.

GENUS ALCES—MOOSE OR OLD WORLD ELK

American Moose

Alces americana (Clinton)

Description.—The largest of the American deer. Its large size (about horse size), generally blackish-brown colour, long legs, high shoulders, long pendulous slightly inflated muzzle, and throat appendage are found in no other species. Its colour is generally blackish-brown in both sexes, but there is considerable variation; underparts the same, lower legs and lower belly washed with tawny grey. Tarsal glands and hoof glands present, but no metatarsal glands. Tail very short and inconspicuous. Hairs on back of neck and mid-line of throat long. Usually a flap of skin, " the bell," from 6 inches to as much as 30 inches hangs from the throat. No canine teeth in upper jaw.

Plate 97. British Columbia Moose, *Alces americana andersoni.*

Measurements.—Adult males weigh from 900 to 1,200 pounds or more and measure from 98 to 108 inches in length, and 66 to 80 inches in height at the shoulder; tail vertebræ 6¾ inches; hind feet 30 to 34 inches. Females about three-fourths the size and half the weight of males.

Antlers.—Broadly palmate and extending laterally from the head. Each palm in mature animals is usually divided into a forwardly projecting portion with two to five tines on it, and a much larger backward and upwardly directed portion with many points along its outer margin. The first antlers, grown by the yearling bull, are usually forked into two short points. The second set bear three points or small palms. After five years the mature type of antler is developed. Antlers are shed by mature animals in December or January, young animals somewhat later.

Biology.—The moose is a forest animal, though it prefers the nutritious young growth of deciduous trees and shrubs that grow in forest areas that have been burned over. The shelter of conifer stands is sought during times of climatic severity. Some animals remain through the year at low elevations, but the majority move into the mountains and as high as the alpine meadows above timberline during the summer. In general the bulls are more migratory that the cows. In Tweedsmuir Park, one moose population makes a migration of as much as 70 miles twice annually.

Food is by preference willows, aspen, red osier dogwood, birch, and balsam fir; lodgepole pine is eaten when other food is scarce. A large variety of aquatic plants is utilized, especially the pond weeds, waterlilies, and horsetails.

Breeding takes place in late September and early October. The gestation period is about 240 to 250 days, with the young arriving about the first half of June. Twinning depends on the adequacy of the range and may be as high as 30 per cent in well-fed herds. Sexual maturity is reached at 18 months and calves are born annually thereafter. Calves are dull brown, unspotted. One newborn calf weighed 36 pounds.

One of the most spectacular events involving large game mammals in British Columbia has been the southward spread of moose in the last forty years. Prior to 1920 there were virtually no moose south of the Hazelton-Prince George line. They have now moved to the International Boundary, and the most dense populations are in this newly invaded territory.

SUBSPECIES

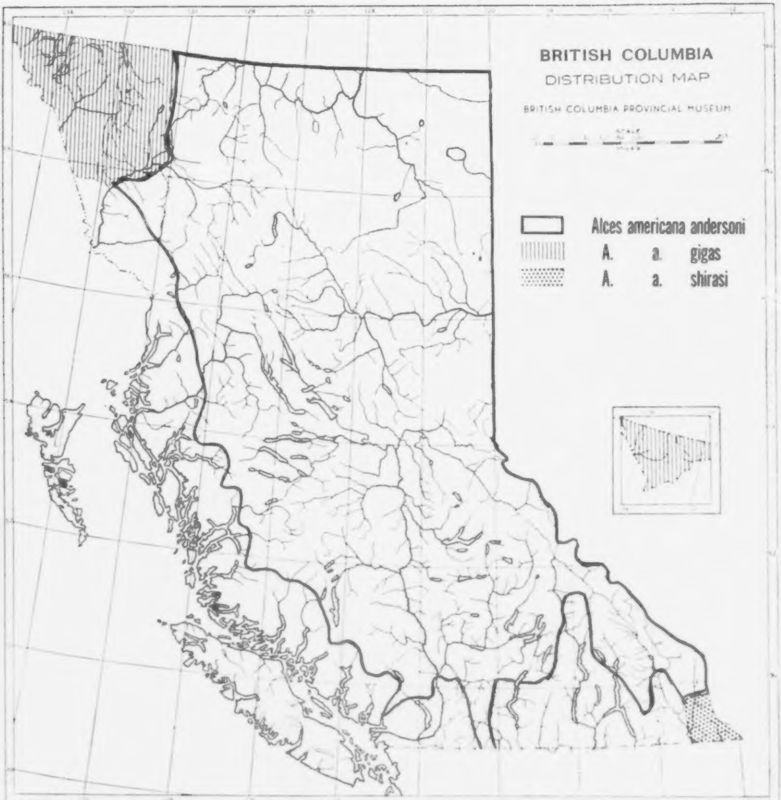
British Columbia Moose

Alces americana andersoni Peterson

Peterson, Occ. Papers Royal Ont. Mus. Zool. No. 9:1–7, 1950. Type locality, 15 miles east of Brandon, Manitoba.

Distinctions.—Intermediate in colour between *shirasi* and *gigas*. Distinguished mainly upon skull characteristics involving width of palate, width of nostril opening, and form of back of skull (occiput).

Measurements.—Of the type specimen and one other mature bull: Total length 106¾ and 104 inches; tail 3¾ and 6¾ inches; hind foot 32¾ and 30½ inches; ear 9¾ and 10 inches; height


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Alces americana andersoni
A. a. gigas
A. a. shirasi

Map 50. Distribution of the Moose, *Alces americana*.

at shoulder 75¾ and 72 inches; weight 1,060 and 1,144 pounds. An old female measured: Total length 93 inches; tail 3½ inches; hind foot 30½ inches; shoulder height 65 inches.

Distribution.—This race occurs in the Peace River District, in the Rocky Mountains throughout their length, in the eastern edge of the southern Selkirks, in the northern Selkirks south occasionally to Glacier. West of the Columbia River there are no moose in the Monashee Mountains, but they are becoming numerous in the forested area south of the Thompson and South Thompson Rivers as far as the Similkameen Valley. Abundant north of the Thompson River and north of the Seton Creek-Anderson Lake area and west as far as the Coast Range. There are scattered records along the west bank of the Fraser between Lytton and Lillooet, at Pemberton Meadows and as far south as Squamish, in the Chilcotin region west to Stuie, and the Skeena Valley to Lakelse. Intergrades with *gigas* in the area north of the Stikine River and west of the Liard River drainage. Intergrades with *shirasi* in the region south of Fernie. Specimens examined from Big Creek, Tupper Creek, Prince George, Vanderhoof, Wells Gray Park, Quesnel, Indianpoint Lake, Williams Lake, mountains south of Ashcroft, Anahim Lake, Ootsa Lake, Invermere, Golden, and many other points within this area.

Alaska Moose

Alces americana gigas Miller

Miller, Proc. Biol. Soc. Wash. *13*:57, 1899. Type locality, Tustomena Lake, Kenai Peninsula, Alaska.

Distinctions.—Larger than the other races and darker in colour.

Measurements. — Total length up to 120 inches; height at shoulders about 90 inches; weight said to reach 1,800 pounds. Two young adult males from the Shesley Mountains (Allen, 1903) measured: Total length 101½ inches; tail 7 inches; hind foot 33 inches; shoulder height 73½ inches. Two adult females: Total length 101½ and 95 inches; tail 8 and 7¾ inches; hind foot 31 and 31½ inches; height at shoulder 70¾ and 72½ inches.

Antlers.—The largest of any race in North America. The record head when first killed measured 81 inches from tip to tip of the antlers at greatest spread.

Distribution.—Occurs only in the extreme north-west from Telegraph Creek north through the Yukon drainage-basin including Atlin and Teslin Lakes. Exact southern and eastern boundaries are unknown. Specimens examined from Telegraph Creek and Atlin.

Yellowstone Moose

Alces americana shirasi Nelson

Nelson, Proc. Biol. Soc. Wash. 27:12 1914. Type locality, Snake River, Lincoln County, Wyoming.

Distinctions.—Smaller in size than *andersoni* and with the back greyish-brown, the ears pale, and more light colour on the legs. There are cranial characteristics also.

Measurements.—Not available.

Distribution.—In British Columbia this race is known only from the Flathead Valley and adjacent Rocky Mountain area south of Crowsnest Pass.

GENUS RANGIFER—CARIBOU AND REINDEER

Description.—Caribou are large or medium-sized deer with somewhat cylindrical bodies. The head is usually carried low, except when the animal is alarmed. Body colour some shade of dull brown, though bleaching is sometimes extreme during winter. In males, head and neck often white or grizzled greyish-white. Males have a mane on underside of neck; tail and surrounding area white, as also a white band around each hoof. Muzzle furred completely across, tail very short, hoofs very large, each part crescent-shaped so that track resembles that of a dairy cow. Incisor teeth very small, canines usually present in upper jaw.

Measurements.—Highly variable from one subspecies to the next.

Antlers.—Both sexes may bear antlers, but the proportion of antlered cows varies with the subspecies. The antlers are of the erect, spreading type, and are semipalmate. One or both of the antlers of the adult male usually bears a long tine projecting forwards over the nose. This is latterally flattened at the tip and called the "plough." The antlers of cows resemble those of 2-year-old bulls and lack the plough.

Biology.—Most of the caribou are creatures of the tundra community or its alpine counterparts. The mountain forms descend into the timber during the winter months. No very large-scale migrations are known in the races occurring in British Columbia. Summer foods include grasses, sedges, horsetails, a variety of flowering plants, and the leaves of willow and dwarf birch. During the winter foliose lichens are a major food item, but weather-dried grass and some willow and birch tips are taken. The mountain species feed heavily on the tree lichens or "beard mosses" during the winter.

The breeding season is in October. The bulls are aggressively polygamous, and a master bull may hold a group of as many as thirty cows together. Harems of five or six are more usual. The gestation period is about 230 days. Most of the young are born in June; they are dark brown and without spots. Single births are the general rule.

Arctic Caribou

Rangifer arcticus (Richardson)

Description.—Large caribou distinguished by having body colour predominantly dark brown; bulls in winter have head and neck pale grey to white. Females usually have antlers. Antlers of mature males large and massive. The mountain caribou and Osborn caribou are subspecies of this species sufficiently distinct to be readily recognizable.

Mountain Caribou

Rangifer arcticus montanus Seton

Seton, Ottawa Naturalist *13*:129, 1899. Type locality, Illecillewaet watershed near Revelstoke, British Columbia.

Distinctions.—Body colour deep blackish-brown; greyish-white on belly, buttocks, and underside of tail, and on neck of male. Antlers comparatively shorter than *osborni*.

Measurements.—Weights to 600 pounds are reported. Three adult bulls measured: Total length 86 inches (84–89); tail 7 inches (6–7); hind foot 25½ inches (24–26½); height at shoulder 49½ inches (49–50). Four adult cows: Total length 79½

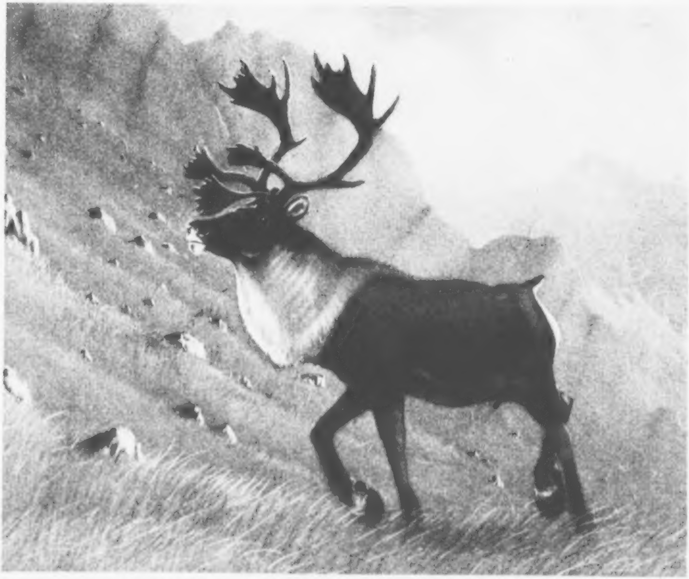


Plate 98. Mountain Caribou, *Rangifer arcticus montanus.*

inches (76–82); tail 7½ inches (6½–8½); hind foot 23 inches (22–23½); height at shoulder 47 inches; weight 284 pounds.

Distribution.—In the Rocky Mountains from the mountains along the Pine River south to Thompson Pass at latitude 51° 45′ N. In the Selkirk and Monashee Ranges, south to the International Boundary in the Moyie Mountains, to the mountains east of Nakusp, and to the headwaters of the Shuswap River. Farther west it occurs south to the Adams River and the Clearwater River, and north to the loop of the Fraser. The race is found also on the eastern slopes and outlying ranges of the Coast Range from Morice Lake south to the Rainbow Mountains, Itcha Mountains, and Cariboo Mountains.

Specimens examined from Rainbow Mountains, Itcha Mountains, Indianpoint Lake, Quesnel Lake, Murtle Lake, Mount Revelstoke, Peters Lake in Monashee Mountains, Moose Pass, Tonquin Pass, Thompson Pass, Selkirk Range east of Kootenay Lake.

Remarks.—As there seem to be no grounds for recognizing the Rocky Mountain population as distinct, the name "*fortidens* Hollister" is regarded as a synonym of *montanus.*

Osborn Caribou

Rangifer arcticus osborni Allen

Allen, Bull. Amer. Mus. Nat. Hist. *16*:149, 1902. Type locality, Cassiar Mountain, British Columbia.

Distinctions.—Larger than *montanus,* antlers proportionately larger, and though highly variable they tend to be taller, with long beams between second tine and crown. General body colour rich dark brown, darkest on head and back; in males greyish-white neck and underparts; buttocks and insides of hind legs white.

Measurements. — Four males measured: Total length 84½ inches (82–88½); tail 7¾ inches (7–8); hind foot 24¾ inches (24–25½); height at shoulder 56 inches (53⅓–60). Three females: Total length 62 inches (59–66); tail 7 inches (6½–7); hind foot 23 inches (22⅓–24); height at shoulder 42 inches (38¾–44¾) (Allen, 1902). Weight said to reach 700 pounds.

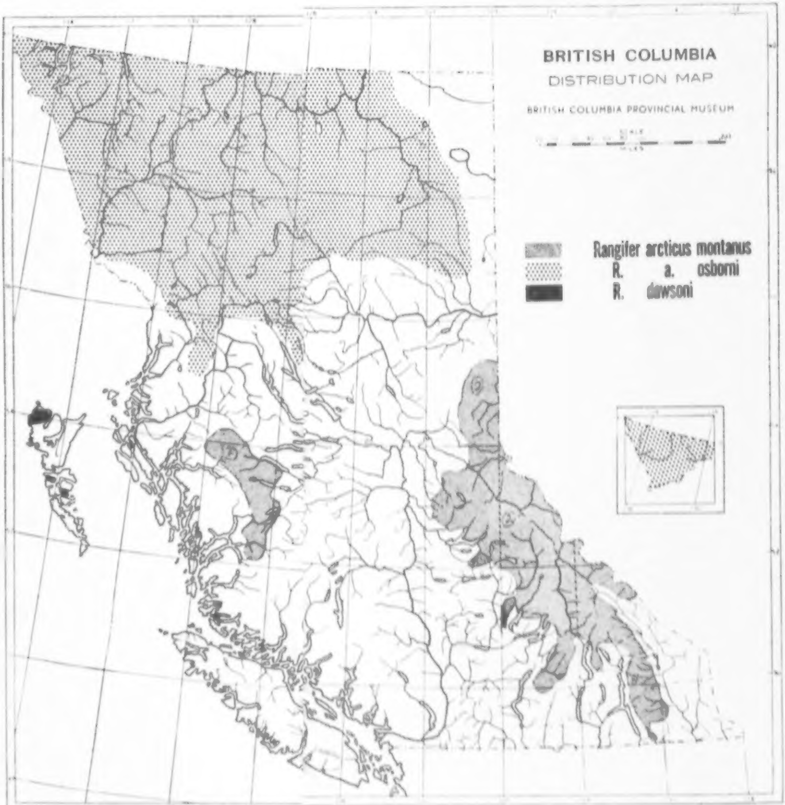
Distribution.—Inhabit the mountains of the Stikine, the Liard, and Finlay River drainages and extends north into Yukon Territory. Western limit recorded as Glenora; the southern point of occurrence is the Omineca Mountains. Specimens examined from Dean Lake, Level Mountain, Omineca Mountain, Tuchodi Lake, Atlin, Telegraph Creek, Cold Fish Lake.

Dawson Caribou

Rangifer dawsoni Seton

Seton, Ottawa Naturalist *13*:260, 1900. Type locality, Graham Island, Queen Charlotte Islands, British Columbia.

Distinctions.—This species is distinguished by its small size and dull mouse-grey colour without dark-brown, black, or white marks.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Rangifer arcticus montanus
R. a. osborni
R. dawsoni

Map 51. Distribution of the Mountain Caribou, *Rangifer arcticus*, and of the Dawson Caribou, *Rangifer dawsoni*.

Measurements.—Total length about 54 inches; tail 3 inches; hind foot 15 inches; height at shoulder 33 inches. This animal was about the size of an average Coast deer buck.

Antlers.—Poorly developed. Two of the three known males have just one antler; cows antlerless.

Distribution.—This species was confined to the area of Graham Island, Queen Charlotte Islands, west of Naden Harbour. Only three specimens have been taken, and these were from close to Naden Harbour. Shed antlers and other signs were known from near Frederick Island, and from the valley of the river running into Virago Sound. The species may be extinct, as nothing definite has been seen of it since about 1920.

Remarks.—Some authors include this as a subspecies of *Rangifer arcticus.* There seems little ground for this, as *R. dawsoni* differs markedly from the mainland *R. arcticus* and was completely isolated from it.

Family BOVIDÆ—Oxen, Sheep, and Goats

Genus BISON—Bison or American Buffalo

Plate 99. Bison or American Buffalo, *Bison bison.*

Description.—The buffalo is so well known as to require little description. Its massive size, completely dark-brown colour, high shoulders, shaggy mane over the forequarters, weak hind quarters, disproportionately large head, short black horns curving out, forward, and then inwards; and the longish tasselled tail are unique.

Biology.—An inhabitant of the parkland country of the Rocky Mountain east slope but wandered on to the alplands, following the riverside meadows. The food was almost exclusively obtained by grazing upon grasses and forbs; browsing was rarely resorted to.

It is highly gregarious in habit, travelling in large herds. Older males frequently were found alone, and these moved into range beyond that occupied by the mass of the species. Most of the skulls still found in the higher parts of the Rocky Mountains were from very old bulls.

The buffalo is polygamous or promiscuous in mating habits. The mating season is in August and the gestation period nine months. Cows mature at three years and usually give birth to a single calf. *See* Soper (1941) for an account of the present-day ecology of the wood bison.

SUBSPECIES

Wood Bison

Bison bison athabascæ Rhoads

Rhoads, Proc. Acad. Nat. Sci. Phila. *49*:498, 1898. Type locality, 50 miles south-west of Fort Resolution, Northwest Territories.

Distinctions.—Larger and darker than the plains bison.

Measurements.—Two bulls from Wood Buffalo Park measured: Total length 134 and 146 inches; tail 17 and 18 inches; hind foot 27 and 25 inches; height at shoulder 68 and 68 inches. Estimated weights 2,000 and 2,200 pounds.

Distribution.—Formerly occupied the extreme northern parts of the Province. One skull of recent origin was taken from the muskeg near Atlin. This or the plains race used to be extremely abundant in the grassland areas along the Peace River, but the last of them were shot near Fort St. John in 1879. Specimens from Atlin, Cecil Lake, and Fort St. John.

Plains Bison

Bison bison bison (Linnæus)

Linnæus, Syst. Nat., ed. 10, *1*:72, 1758. Type locality, Mexico.

Distinctions.—Reported to be smaller and paler than the wood bison, but the available measurements throw some doubt on the size differences.

Measurements.—Cows average 84 inches in total length; tail 18 inches; hind foot 20 to 21 inches; height of shoulder about 60 inches; weight about 1,000 pounds. Bulls are reported by Seton (1937) to have a total length of 120 to 150 inches; tail 20 to 36 inches; hind foot 23 to 26 inches; shoulder height 66 to 72 inches.

Distribution.—Entered the extreme eastern part of the Province where continuous alpine meadows crossed from the Alberta side of the Rocky Mountains. One specimen from the British Columbia side of Howse Pass (latitude 51° 50′).

GENUS OREAMNOS—AMERICAN GOAT-ANTELOPE

Mountain Goat

Oreamnos americanus (Blainville)

Description.—This is an antelope with little resemblance to, or kinship with, the goats. The colour is white throughout, though kids frequently show a strong intermixture of brown hair along the back. Shoulders high, and along mid-line of neck and shoulders hair is long and stiff, producing an abrupt ridge. Pelage is composed of a dense covering of white wool, and over this a coat of long guard hairs. These are longest on the dorsal ridge, lower sides, and upper parts of legs; lower legs thinly furred. A double beard of long hair on the "chin." Ears sharp, pointed; muzzle black; horns black, rising in a smooth backward curve. A pair of large "leathery" glands behind base of each horn.

Biology.—The goat inhabits the roughest possible terrain, generally at altitudes at or above timber-line. In the northern ranges

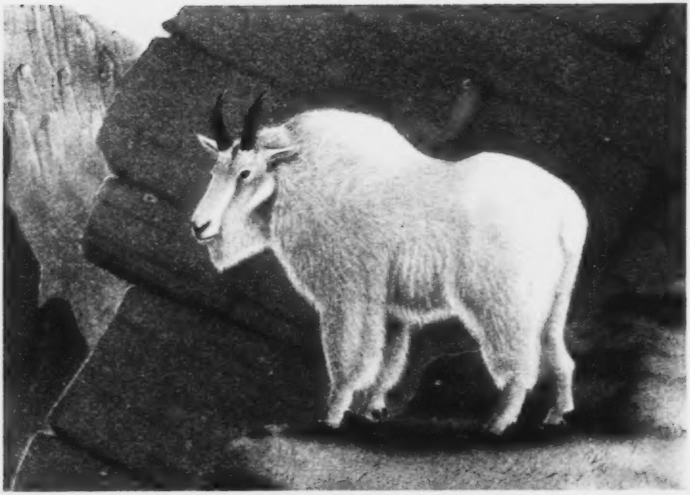


Plate 100. Mountain Goat, *Oreamnos americanus.*

of Cassiar and locally in the Rocky Mountains it sometimes moves beyond easy reach of cliffs and broken rock, but in general it roams always within reach of such escape terrain. In the Coast Range deep snows may force it to sea-level during the winter months. Its survival depends upon the availability of wintering areas where snow conditions are not too severe. These are sought in areas of low snowfall or fierce winds, usually on slopes exposed to the south or west.

Food is most varied and includes a great variety of alpine grasses and forbs, and almost all the tree and shrub species save spruce. It is one of the few game species that will eat buffaloberry (*Shepherdia canadensis*) and western hemlock (*Tsuga heterophylla*). Goats make great use of dry alkaline earth licks and may travel 2 or 3 miles through timber to reach them. Use of licks is from June to August.

Females and young are gregarious and move in large or small groups, depending upon the density of the population. Males are usually solitary, but sometimes two or three will be found together. Little is known of the breeding habits; the rut takes place in November and the gestation period is six months. There is usually a single young, but twins occur.

The main causes of death are not known. There is no evidence that predation is important; the animal is subject to very heavy stomach-worm infestations that can be damaging. Snow-slides kill some, but it seems that winter conditions of snow, cold, and sometimes food shortage are probably critical. The percentage survival of young to yearling age is usually low.

Horns.—The horns of males sweep upwards and backwards in an even curve from base to tip, diverging slightly. Those of the female rise without curving for two-thirds of their length and curve abruptly backwards at the tip; they are also more slender than those of males.

Horns of both sexes have been taken up to 12 inches in length, but those over 11 inches are scarce. Basal circumference of horns of males up to 6½ inches, of females to 4¾ inches.

SUBSPECIES

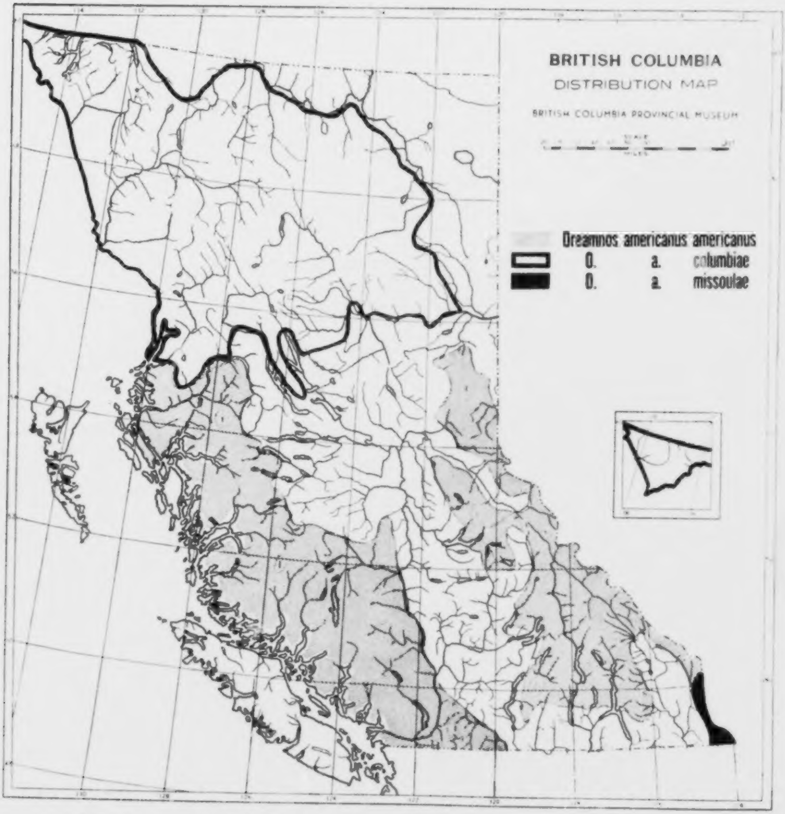
Oreamnos americanus americanus (Blainville)

Blainville, Bull. Sci. Soc. Philom. Paris, p. 80, 1816. Type locality, Cascade Range near Columbia River in Washington or Oregon, probably Mount Adams, Washington.

Distinctions.—Differentiated from the other races on cranial characters.

Measurements.—Two adult males measured: Total length 62 and 68 inches; tail 5½ and 6 inches; hind foot 13 and 14 inches; shoulder height 35 and 48 inches. The smaller weighed 260 pounds. The measurements of four females were: Total length 56 inches (54½–57); tail 5 inches (5–5½); hind foot 13 inches (12–13⅜); shoulder height 35 inches (34¾–35½).

Distribution.—Occurs in the Coast and Cascade Ranges from the International Boundary north at least to the Skeena Valley, though the distribution is very local and there are large areas devoid of goat. Found also in the Monashee and Selkirk ranges north to


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
SCALE
MILES
Oreamnos americanus americanus
O. a. columbiae
O. a. missoulae

Map 52. Distribution of the Mountain Goat, *Oreamnos americanus.*

the loop of the Fraser River. In the Rocky Mountains it occurs from the headwaters of the Pine River south to Crowsnest Pass, where intergradation with *missoulæ* becomes obvious. Specimen records from Tesla Lake, Kynoch Inlet, Cornice Creek, Wells Gray Park, Bella Coola, Texas Creek, Sugar Lake, Shorts Creek, Akolkolex River, Manning Park.

Oreamnos americanus columbiæ Hollister

Hollister, Proc. Biol. Soc. Wash. *25*:186, 1912. Type locality, Sheslay Mountains, British Columbia.

Distinctions.—Separated from *americanus* on basis of supposed larger size and narrower skull, but the characteristics have not been critically evaluated.

Measurements.—Three adult males from the type locality measured as follows: Total length 65 inches (61–66); tail 7¾ inches (7–8); hind foot 14¼ inches (13½–14¾); height at shoulder 38¾ inches (37–39⅞).

Distribution.—Imperfectly understood. The name may apply to all the goats north of the Peace River and Skeena River. In this area all suitable mountain ranges are inhabited, but as everywhere the distribution is discontinuous. Recorded from Bennett Lake, Sheslay Mountains, Atlin, Omineca Mountains, Cold Fish Lake, Bear Lake.

Oreamnos americanus missoulæ Allen

Allen, Bull. Amer. Mus. Nat. Hist. *20*:20, 1904. Type locality, Missoula, Missoula County, Montana.

Distinctions.—Smaller in size than *americanus* with a narrower skull.

Measurements.—One adult male: Total length 59 inches; tail 6 inches; hind foot 21½ inches; shoulder height 34½ inches.

Distribution.—In our judgment only those specimens from south of Crowsnest Pass subscribe to the characteristics of this race, though specimens from the southern part of Banff Park are intermediate between *missoulæ* and *americanus*. We include all those from the Bow River north unequivocally with *americanus*. Specimen from Wall Lake.

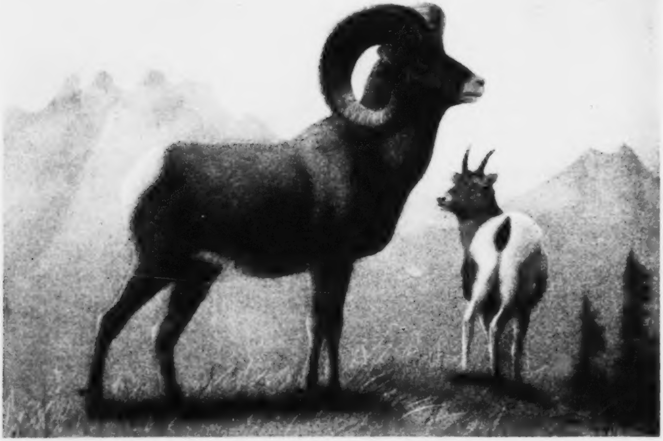


Plate 101. Bighorn Sheep, *Ovis canadensis*.

Bighorn Sheep

Ovis canadensis Shaw

Description. — A large sheep, brown in colour, with belly, insides of legs, large rump patch, and usually part of muzzle white. Small preorbital glands; ears small, pointed, hairy; tail short, chin without a beard; horns distinctive; front hoofs longer than hind.

Horns.—Of males when mature curve upward, back, downward, and forward in a spiral, though the degree of curvature varies widely from one locality to the next. Horns are marked with growth rings as transverse ridges and furrows. The outer angles of the horns are not prominent. Horns brown.

Horns of female short, brown, erect, and backwardly curved, resembling those of a domestic she-goat.

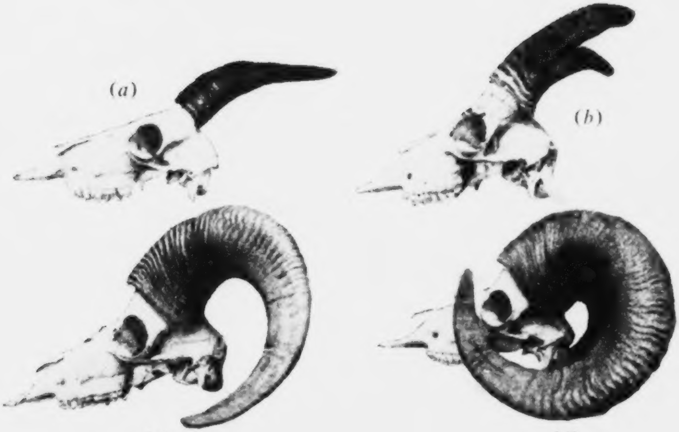


Fig. 29. Horns of (*a*) female, (*b*) young male, (*c*) 5-year male, and (*d*) adult male bighorn sheep

Horns of young males are shown in Fig. 29. The horns of large males constitute one of the most sought after of the big-game trophies. The largest heads come from the Rocky Mountain area adjacent to Fernie.

Biology.—The sheep is primarily a grazing animal, feeding upon the grasses and forbs of its mountain range. Various species of bluegrass, junegrass, and wheatgrass are particularly relished. Among the most sought after alpine food plants is the dwarf willow, *Salix nivalis.* Browsing is often resorted to, but the use of conifers, such as Douglas fir, is usually an indication of scarcity of more suitable feed.

It is gregarious through the year. Rams over 3 years of age usually segregate in late spring into bands of rams only and occupy a summer range separate from the ewes and young. Migrations of as much as 40 miles may be undertaken between alpine summer range and low-level winter ranges. Some bands, where alpine range is not available, remain on their winter range throughout the year.

The bighorn is promiscuous in mating behaviour; mating occurs from October through December in different parts of the range; late November and early December is the most usual breeding season. The gestation period is 180 days, and lambs are born in late May and early June—earlier in those groups with an early mating season. Twins and single births are about equally frequent in well-nourished herds. Ewes mature at 2 or 3 years, rams possibly at 3 years.

Predators are coyotes (on the young and on the ewes), mountain lions, and, very occasionally, bobcats, bears, and golden eagles. Predation is only important on small relic bands that are particularly vulnerable.

The main causes of death appear to be hæmorrhagic septicæmia, winter exposure, stomach and intestinal worms; lump jaw (actinomycosis) is prevalent on most ranges. (*See* Cowan, 1940, for classification and distribution, and Cowan, 1952, for parasites and diseases.) A maximum age of 14 years is reached by a few individuals.

SUBSPECIES

California Bighorn

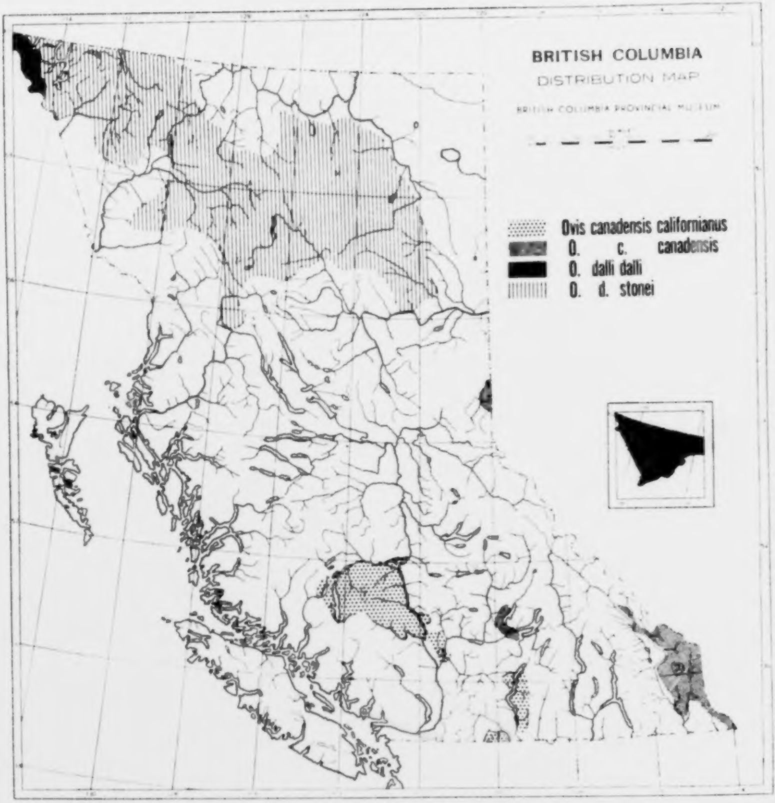
Ovis canadensis californiana Douglas

Douglas, Zool. Journ. *4*:332, 1829. Type locality, Mount Adams, Yakima County, Washington.

Distinctions.—Differs from *canadensis* in slightly darker colour, less white on face, horns with more open curl and usually with tips complete or nearly so. Cranial differences are diagnostic. (*See* Cowan, 1940.)

Measurements.—Adult rams: Total length about 70 inches; tail 4 inches; hind foot 17 inches; height at shoulder 32 inches. One ewe measured: Total length 56 inches; tail 5 inches; hind foot 14½ inches; height at shoulder 31 inches.

Biology.—Certain populations of this race are reported to have a very long breeding season, beginning in late September or October. Neither of us have been able to study the herds in question to confirm or deny this. Young are born from early April to late May.


BRITISH COLUMBIA
DISTRIBUTION MAP
BRITISH COLUMBIA PROVINCIAL MUSEUM
Ovis canadensis californianus
O. c. canadensis
O. dalli dalli
O. d. stonei

Map 53. Distribution of the Bighorn Sheep, *Ovis canadensis*, and of the Thinhorn Sheep, *Ovis dalli*.

Distribution.—About 200 head in the Ashnola Mountains; other bands east of Vaseux Lake, about 100 head; east of Penticton, 35 head; Shorts Creek, 35 to 45 head; in the Marble Mountains south of Jesmond; along the canyon of Chilcotin River near its junction with the Fraser River, about 100 head; in the mountain area west of the Fraser, north of Lillooet, and south of the head of Riske Creek, possibly 400± head. Specimens examined from Chilcotin River, Churn Creek, Jesmond, Shaw Creek, Penticton Creek, Lillooet, Texas Creek, Vaseux Lake, Ashnola River.

Rocky Mountain Bighorn

Ovis canadensis canadensis Shaw

Shaw, Naturalists Miscellany, 15; text to Plate 610; 1804. Type locality, Bow River near Exshaw, Alberta.

Distinctions.—Slightly larger and paler than *californiana,* with horns generally curled closer to the head, more massive, and usually with the terminal one to two years' growth broken off in old males.

Measurements.—Three old males measured: Total length 70 inches (66–73); tail 5 inches (4–6); hind foot 17½ inches (17–17¾); height at shoulder 40 inches (37–44).

Biology.—Mating usually in November, young born in June.

Distribution.—The western slope of the Rocky Mountains from the Crowsnest Pass and Bull River north to just south of Golden, and at the head of Sheep Creek north of Mount Robson.

Introduced and a small band established at Squilax, straggling success for introductions at Adams Lake and Spences Bridge.

There are no authentic records for Rocky Mountain bighorn in the Selkirk Range or elsewhere outside the Rocky Mountains, save for the introduced populations mentioned.

Specimens examined from Cross River, Whitewater Lake, Wapiti River, Sheep Creek north of Mount Robson, head of Kootenay River, Mount Quintette on Kiskatinaw River, east of Cranbrook, Elko, Jarvis Pass, Fording River.

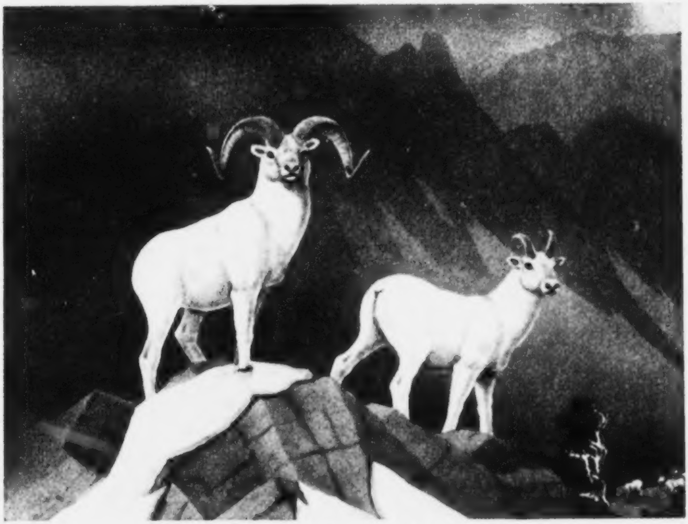


Plate 102. Dall Sheep, *Ovis dalli dalli*.

Thinhorn Sheep

Ovis dalli Nelson

Description.—A medium-sized sheep with slender horns. The usual form of horns in the male is a much more open and spreading spiral than in the bighorn sheep. Horns in life are paler than those of the bighorn and usually having the angle over the eye elevated into a prominent ridge more rugose than the remainder of the horn. Colour varies from completely white to dark, usually sooty, brown, with head, belly, inside of legs, and rump patch white.

Biology.—In general habits the thinhorn and bighorn sheep are closely alike. The rut is from mid-November to mid-December and the gestation period about six months.

SUBSPECIES

Dall Sheep

Ovis dalli dalli Nelson

Nelson, Proc. U.S. Nat. Mus. 7:13, 1884. Type locality, probably Tanana Hills, on west bank of Yukon River, Alaska.

Distinctions.—Typically white all over, with pale, almost yellowish horns and hoofs. Intergrades over a very broad area with Stone sheep, and all degrees of pigmentation occur in this area of intergradation. Frequently there are black hairs on the tail.

Measurements.—Four adult males from Nahanni River, Yukon, measured: Total length 56 inches (53–61); tail 4 inches (3½–4¾); hind foot 16 inches (15¾–17); height at shoulder 37 inches (36½–40). One adult ewe measured: Total length 54 inches; tail 3½ inches; hind foot 15 inches.

Distribution.—In British Columbia occurs only in the mountains of the Saint Elias Range in its pure form, but the mountains adjacent to Lake Teslin have sheep more like *dalli* than *stonei.*

Stone Sheep

Ovis dalli stonei Allen

Allen, Bull. Amer. Mus. Nat. Hist. 9:111, 1897. Type locality, headwaters of the Stikine River, British Columbia.

Distinctions.—Typical colour blackish-brown except for white face, abdomen, inside of legs, and rump patch. Horns darker than *dalli* but paler than *canadensis.* In many areas to the northward the colours are paler and the amount of white greater, until only the saddle, tail, and lower legs are dark.

Measurements.—Four adult males measured: Total length 64 inches (52–71); tail 4 inches (3–4½); hind foot 17 inches (16½–18). Measurements of one adult ewe were: Total length 52 inches; tail 3 inches; hind foot 15 inches; height at shoulder 32½ inches.

Distribution.—The Omineca and Cassiar Districts, generally north of latitude 56°, west to the summit of the Coast Range and to Atlin Lake, east to the Rocky Mountains, south to the Peace

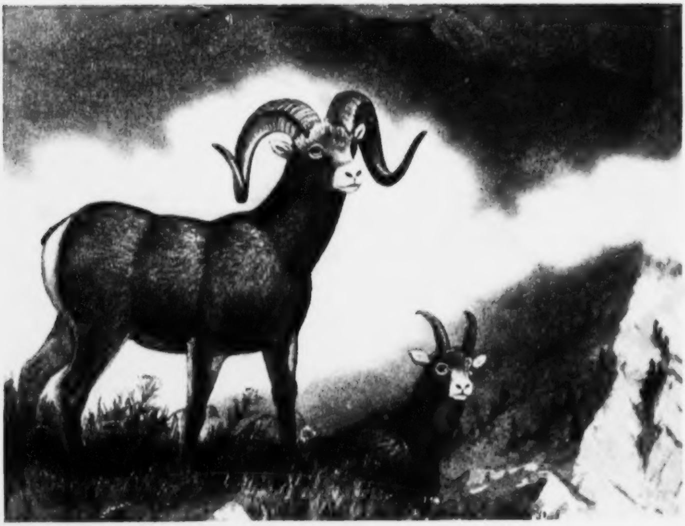


Plate 103. Stone Sheep, *Ovis dalli stonei.*

River along the slopes bordering the Nabescke River. Known from the Ingenika Range, Klappan Range, the mountains of the southern Liard drainage, north in the Cassiar Mountains and adjacent ranges into Yukon Territory. Specimens examined from Dease River, Laurier Pass, Liard River, Muskwa Lake, Klappan River, east of Turnagain River, Cassiar Mountains, Cassiar Pass, Keilly Creek, Sikanni Chief River, Prophet River, Ottertail River, Halfway River, Stikine River, Iskoot summit, Shesley Mountains, Tuchadi Lake, Nakinaw River, Telegraph Creek, Forty Mile Creek.

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GLOSSARY OF SCIENTIFIC TERMS

Alisphenoid canal—canal on alisphenoid bone of the skull (*see* Fig. 24 (*a*)).

Auditory bullæ—two prominences formed by bones of the ear; situated one on either side at the base of the skull.

Basilar length—total length of the skull measured from the basal extremities; i.e., anterior margin of the foramen magnum to, and including, the incisors, or distal point of the premaxillaries where incisors are absent.

Blastocyst—the egg shortly after fertilization.

Calcar—spur-like process on the hind foot of bats; attached to and supporting, in part, the interfemoral membrane.

Canine teeth—single tooth prominent in carnivores; situated between incisors and molars. Often termed the *fang*.

Carnassial teeth—fourth upper premolar and first lower molar in carnivores, specialized for flesh-shearing.

Condyles (occipital)—bony processes at the base of the skull surrounding the occipital foramen; articulate with first unit of the backbone.

Cranial breadth—greatest width of the brain case.

Crepuscular—active during twilight hours.

Diastema—space without teeth between the canine and premolars.

Ear pinna—the external sound-gathering portion of the ear; commonly termed *ear*.

Foramen magnum—large opening at the back of the skull through which the spinal cord passes. Same as occipital foramen.

Fluke—the laterally expanded portions of the tail in whales.

Incisor—the most forwardly placed teeth in the mammalian skull; where present, arising in the premaxillary bone above; at the anterior end of the lower jaw below.

Infraorbital foramen—opening in the maxillary bone of the skull immediately below the front corner of the eye.

Interfemoral membrane—membrane joining the hind legs and tail of bats.

Internal cusps—prominent points on the inside edge of the crown of teeth.

Interorbital breadth — the narrowest portion between the eye-sockets, measured across the top of the skull.

Lambdoidal ridge—a bony ridge forming the upper hinder margin of the skull; marks the limit of the attachment of neck muscles to the skull.

Maxillary bone—that bone carrying the cheek teeth of the upper jaw (*see* Fig. 2).

Maxillary breadth—greatest width measured across the skull at the maxillary bones.

Meatus (of ear)—external opening of the ear.

Molar teeth—cheek teeth (*see* Fig. 2).

Notch (of ear)—lowermost notch before the opening of the ear.

Occipital foramen—opening at base of skull, through which the spinal cord joins the brain.

Palatine foramina—openings, one on each side of the mid-line, in bones forming the roof of the mouth. Usually a large pair anteriorly and a small pair posteriorly.

Premolars—teeth situated between the canines and the molars; represented in the milk-tooth set.

Postorbital process—bony processes above and below the eye-sockets.

Rostrum—Upper portion of the mammalian skull forward of the eye-sockets.

Subterminal claws—claws not situated at the end of the paw or flipper.

Terminal claws—claws situated at the end of the paw or flipper.

Trenchant cheek teeth—cheek teeth with shearing edges.

Unicuspid teeth—teeth with but a single point on the crown.

Zygomatic arch—the cheek bones running below the eye to form an arch.

Zygomatic width—width of the skull measured at and including the zygomatic arches.

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